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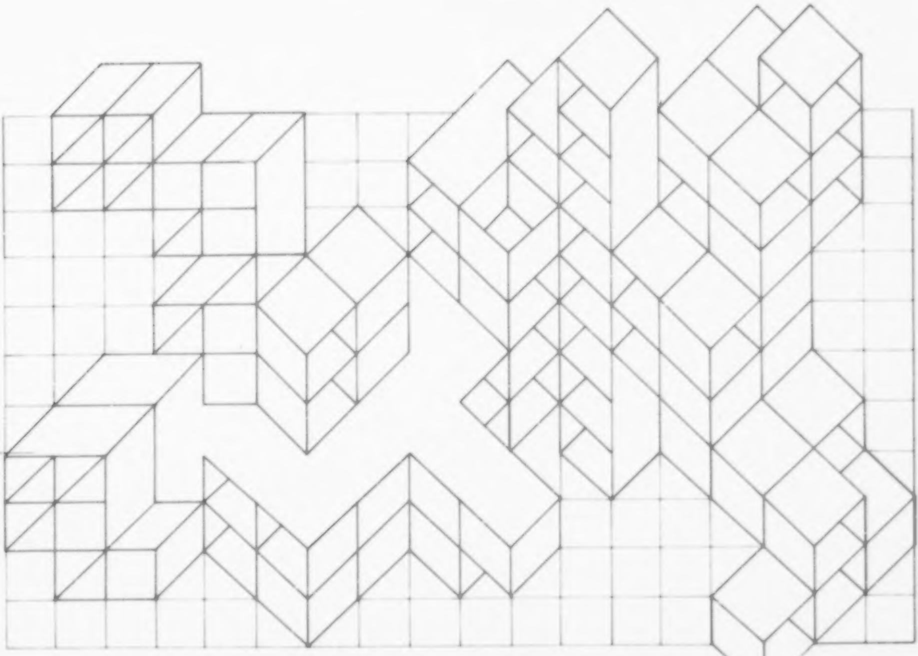

Association of American Medical Colleges

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Medical Education in the United States and Canada

August G. Swanson, M.D.

Many comprehensive reports of American medical education have appeared since the 1910 landmark work by Abraham Flexner (1). From them one can gain insights into the evolution of U.S. and Canadian medical education and the institutions engaged in biomedical education and research (2–14).

To provide the framework for the special reports that emanated from the efforts of the Project on the General Professional Education of the Physician and College Preparation for Medicine, a comprehensive description of medical education has been developed. This includes information on U.S. and Canadian medical schools, applicants and students, curricula, scheduling of time, and grading. Some comments about career plans of 1983 graduates from U.S. medical schools and students' perceptions of their education conclude the narrative. Data are drawn from sources developed by the Association of American Medical Colleges and the Association of Canadian Medical Colleges (15–20).

The Medical Schools

There are a total of 143 medical schools in the United States and Canada (tables 1 and 2). In 1983–84, 127 medical schools in the United States had students enrolled, although two were so new they had not yet graduated their first classes. In contrast, three of the U.S. schools were founded in the late 1700s: the University of Pennsylvania School of Medicine in 1765, Harvard Medical School in 1782, and Dartmouth Medical School in 1797. Almost one third—41—of all medical schools in the United States came into existence in the past quarter century (16). Seventy-five of the 127 U.S. schools are publicly owned. Of the 52 medical schools that are privately owned, 35 receive financial assistance from the states in which they are located (21). The medical schools tend to be concentrated in the populous states; New York has the largest number with 12, and California follows with eight. Five states have no schools.

The 16 medical schools in Canada are all publicly owned and supported. They also are found in the more populous provinces in the eastern part of the continent. Ontario has five medical schools, five provinces have only one school, and four provinces have no medical schools. The first Canadian medical school established was the McGill University Faculty of Medicine in Montreal, Quebec, in 1829. Four of the 16 schools were founded in the last quarter century (16).

The number of full-time faculty members ranges from over 2,000 to fewer than 100. They are responsible for the education of medical students, residents, graduate students in the basic sciences, and clinical fellows (Table 3). Medical student enrollments vary from over 1,300 to

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fewer than 100. In both the United States and Canada, however, the total number of residents, graduate students, and fellows is larger than the total number of medical students enrolled.

Medical faculties are also engaged in research and patient care. Table 4 shows the sources of financial support for U.S. medical schools in 1981–82. Federal research support from grants and contracts and income derived from medical services constituted 57 percent of the total support of activities in U.S. medical schools.

The involvement of faculties in research varies from institution to institution. In the United States, 20 medical schools had research expenditures of $20 million or more in 1981–82; 17 had research expenditures between $10 and $20 million; and 86 expended less than $10 million on research programs. The range was from $50.6 million to $11,600. Three Canadian schools expended over $20 million on research; seven between $10 and $20 million; and six less than $10 million. The range was from $28.9 to $3.1 million (Table 5).

Teaching hospitals are vital components of academic medical centers. The principal teaching hospitals in the United States are members of the Association of American Medical Colleges' Council of Teaching Hospitals (COTH). In 1980 the 327 nonfederal members of COTH made up 5.8 percent of all hospitals in the United States. These hospitals provided 20 percent of the acute patient care days and 30 percent of outpatient visits in the country. In combination with 74 Veterans Administration hospital members of COTH, teaching hospitals provided 75 percent of the graduate medical education positions in the United States. Medical student education is principally provided by these hospitals, all of which are either owned by or affiliated with a medical school (17, 18).

Applicants and Matriculants

Data on applicants and matriculants to U.S. medical schools are reported for the first-year new entrants to the class of 1983–84 and to Canadian medical schools for the first-year new entrants to the class of 1982–83 (19, 20).

A total of 35,200 individuals filed 319.340 applications—an average of nine applications each—for the 16,480 places to be filled by new entrants to U.S. medical schools in 1983–84. Of these applicants, 48.9 percent were accepted for admission. The acceptance rate for men applicants was 49.8 percent, and for women applicants it was 47.1 percent. Thirty-four percent of the applicants were women, and they filled 32.6 percent of the new places available (5,370). Forty-seven percent of all applicants were enrolled. Black Americans, American Indians, Mexican Americans, and Mainland Puerto Ricans represented 9.6 percent of the first-year class. Approximately 42 percent of these entrants were women. The predominant age group of the 1983 entering class was 21 to 23 (64 percent). Four percent were 20 years of age or younger, and 32 percent were 24 or older.

A total of 7,720 persons filed 19,587 applications—an average of 2.5 applications each—for the 1,931 places to be filled by new entrants to Canadian medical schools in 1982–83. Of these applicants, 25 percent were accepted for admission and enrolled. Men constituted 57 percent of the applicant pool and women 43 percent. The acceptance rate for men applicants was 24.4 percent, and for women applicants it was 25.8 percent.

The college majors of all applicants to U.S. medical schools and those accepted for admission in 1983 are shown in Table

6. Majors in the biological sciences predominated with 45 percent of the applicants and 42 percent of those accepted having majors in this area. The physical sciences were the next largest group at 23 percent and 26 percent, respectively. Nonscience majors comprised 10 percent of the applicants and 10 percent of those accepted. Four percent of the applicants had majors in nursing, pharmacy, and other health professions; three percent were accepted.

The academic records of those accepted to enter the U.S. 1983–84 class were high (Table 7). The overall grade point average of 76 percent of those accepted was 3.30 or higher on a scale of 0 to 4. Almost three of every four applicants accepted for admission (74 percent) had grade point averages in the 3.30 to 3.99 range.

Applicants with higher scores on the Medical College Admission Test had a distinct advantage. Of the 17,311 U.S. applicants with grade point averages in the 3.30 to 3.99 range, 72 to 76 percent of those with Medical College Admission Test subtest scores of 8 to 15 were accepted. Only 31 to 46 percent of the applicants in the same grade point average range with Medical College Admission Test subtest scores of 1 to 7 were admitted (19).

During the years 1981, 1982, and 1983, 839 colleges and universities supplied an average of at least five applicants to U.S. medical schools (Table 8). One half of the applicants came from 104 institutions that provided between 86 and 519 applicants each. The remaining half came from 1,591 other colleges and universities, and 1,063 supplied nine or fewer. Accordingly, students in the entering classes of most medical schools in the United States come from a large number of colleges and universities. In 1983, members of the average entering class came from 51 different institutions. The range was from seven to 105 (Table 9).

The Curricula

In all except two schools the general professional education of medical students is a four-year program. The University of Calgary Faculty of Medicine, Calgary, Alberta, and McMaster University School of Medicine, Hamilton, Ontario, have three-year curricula. In general, four-year curricula are divided into a preclinical phase, occupying the first two years, and a clinical phase in the last two years. The preclinical phase is predominantly devoted to study of the major disciplines in the sciences basic to medicine: anatomy, pathology, physiology, microbiology, biochemistry, pharmacology, and human behavior. During the clinical phase, students are assigned to the clinical services of teaching hospitals for required clerkships in the major clinical disciplines: internal medicine, surgery, pediatrics, obstetrics/gynecology, psychiatry, and, in some schools, family medicine. Subsequent to completing their required clerkships, students have varying periods of time for elective courses and clerkships during their final year.

PRECLINICAL CURRICULA

There are four patterns of preclinical instruction.

Disciplinary—Each basic science department has the responsibility for teaching a course in its discipline. Fifty-six percent of the schools have this pattern of instruction.

Disciplinary with a correlative course—The basic sciences are taught by each department, but in the second year, a major interdisciplinary course involving both basic and clinical disciplines provides correlations between basic science concepts and principles and the manifestations of disease. Thirty-five percent of the schools use this pattern.

Systems—At nine percent of the schools the curriculum is organized around body organ systems. Interdisciplinary groups of basic scientists and clinicians work together in planning and teaching courses about each organ system. At some of these schools the sequence of organ system courses is preceded by a brief sequence of introductory basic science courses.

Problem-based—A problem-based approach to teaching and learning is used to varying degrees at four schools. In one school, the entire preclinical curriculum is taught using this method with students in small groups. Clinically based problems are presented to students who are required to seek out information and take primary responsibility for formulating solutions themselves under the guidance of a mentor.

The length of time allocated to instruction during the preclinical phase varies from 41 to 115 weeks (Table 10). The average is 74 weeks. Twenty-five to 30 hours a week of the medical students' time is usually scheduled. Although at some schools as few as 15 to 20 hours a week are scheduled, at others students have scheduled activities for as many as 35 to 38 hours a week. These variations in the number of weeks and in the intensity of weekly scheduling are reflected in the variability of total instructional hours in preclinical curricula, which range from 1,028 to 2,430 hours (Table 11).

The lecture is the predominant method of instruction (Table 11). In medical schools in the United States and Canada the number of lecture hours ranges from 468 to 1,639. The proportion of total scheduled time devoted to lectures varies from 36 to 78 percent (Table 12). In addition to this, in most schools conference hours are scheduled, and some of this time may be used for additional lectures (Table 11).

The number of hours scheduled for laboratory work and the proportion of total hours devoted to laboratories is as low as 68, four percent of scheduled time, to as high as 834, 44 percent of scheduled time (Tables 11 and 12). Laboratory time is greatest in schools with disciplinary curricula, and the two disciplines with the largest proportion of laboratory time are anatomy and pathology. Of the basic sciences, biochemistry has the least emphasis on laboratory work. Only 45 schools incorporate laboratory work into their biochemistry courses.

The distribution of scheduled time among disciplines is shown in Table 13. Estimates of time distribution are derived from an analysis of the *1983-84 AAMC Curriculum Directory*. For 109 to 115 schools the time allotted to the seven major preclinical disciplines can be estimated. For the remaining 34 schools, course titles do not identify clearly which disciplines are involved. This is particularly true for schools with organ-system-based curricula.

Anatomy—Includes gross anatomy, histology, embryology, and, in some cases, neuroanatomy. At those schools with neuroscience courses, neuroanatomy is subsumed in that course. An average of 350 hours is scheduled for anatomy. The range is from 135 to 612.

Pathology—Includes anatomic and, in some cases, clinical pathology. At some schools there is a separate course in laboratory diagnosis. On average, 233 hours are scheduled for pathology. The range is from 105 to 418.

Physiology—On average, 167 hours are scheduled for physiology. The range is from 90 to 341. At schools with neuroscience courses and at schools with organ system pathophysiology courses in the second year, there are fewer scheduled hours in physiology.

Microbiology—Includes microbiology, immunology, infectious diseases, and parasitology. On average, 155 hours are scheduled for microbiology. The range is from 66 to 291.

Biochemistry—On average, 137 hours are scheduled for biochemistry. The range is from 55 to 272.

Pharmacology—On average, 129 hours are scheduled for pharmacology. The range is from 50 to 240.

Neurosciences—Not all schools have a specific course in the neurosciences. On average, the 75 schools that have a course in the neurosciences schedule 109 hours. The range is from 18 to 210 hours.

Behavioral sciences—Includes human behavior and psychiatry. The 105 schools with a course in behavioral sciences on average schedule 91 hours. The range is from 20 to 223.

Preventive medicine-epidemiology—Includes community medicine and biostatistics. There are 83 schools that schedule 51 hours on average in these disciplines. The range is from eight to 198.

Genetics—There are 65 schools with a separate genetics course. On average, 27 hours are scheduled for genetics. The range is from five to 69 hours.

In addition to studies in the seven major areas, all schools provide a course usually titled "Introduction to Clinical Medicine" during the preclinical phase. The purpose of this course is to provide students with an opportunity to develop sufficient clinical skills to begin their work with patients in their third-year clerkships. At 71 schools, the students' initial experience in interviewing and examining patients occurs in their first year, and in the second year additional time is allocated for this purpose. The intensity of exposure to patients during the first year varies. At 27 schools, between 100 and 200 hours of the first-year program are scheduled for this introductory experience. At 19 schools, 50 to 100 hours are scheduled, and 25 schools schedule fewer than 50 hours. At the remaining schools, direct experience in interviewing and examining patients is reserved for the second year (15).

The time available for elective courses during the preclinical curriculum is generally quite restricted. Table 14 reveals that relatively few students take electives in the basic sciences.

In summary, the preclinical curricula in U.S. and Canadian medical schools are predominantly devoted to seven basic sciences. The lecture is the principal method of instruction. At some schools lectures occupy over 70 percent of scheduled time. Anatomy and pathology, on average, use 46 percent of the time scheduled for instruction in the seven major basic science disciplines.

CLINICAL CURRICULA

The clinical curricula of U.S. and Canadian medical schools are divided into blocks of time for clerkships in the major clinical disciplines. Students are assigned to the clinical services of teaching hospitals for periods varying from one week to 12 weeks. Clerkships are required in medicine, surgery, pediatrics, obstetrics/gynecology, and psychiatry at all schools. Family medicine is required at 56 schools, and neurology at 64. Table 15 shows the number of weeks of required clerkships in these disciplines at the schools whose entries in the *1983–84 AAMC Curriculum Directory* permit an analysis of the distribution of time among clerkships.

In addition to these major clerkships, some schools require clerkships in other specialties. Twenty-seven schools require one to four weeks in anesthesiology (average is two). At 10 schools one to four weeks of dermatology are required (average is two). At 16 schools a clerkship in radiology ranging from one to four weeks is required (average is three). Seven schools require one to four weeks in physical medicine and rehabilitation (average is two), and 20 schools require one to eight weeks in community medicine (average is four).

A clerkship designated as primary care is required in 21 schools. These clerkships vary from two to 12 weeks (average is six). A subinternship of four to eight weeks in one of the major specialties is required by 16 schools (average is six). Eight schools provide a period of two to 12 weeks during their clinical curricula for seminars in the basic sciences. At one school an entire academic year is devoted to electives in the basic sciences following a year of required clerkships.

Required clerkships are principally scheduled for the third-year of medical school. Many schools combine the last two years into one academic period. After completing their required clerkships, students have varying periods of time for electives (Table 16). Each student may schedule the elective period according to his or her interest, or the student may be required to select some electives from a number of designated specialties. Over 60 percent of students take electives in cardiology and radiology. Emergency medicine, the choice of 41 percent of the students, is the next most popular (Table 17).

Grading and Evaluation

Approximately one half of all U.S. medical schools use the honors/pass/fail form of grading (Table 18). Twenty-one schools use a pass/fail system for basic sciences, 17 for clinical clerkships, and 38 for electives. Letter or number grades (usually A, B, C, D, and F) are used at the remainder of the schools.

In basic science courses, students are principally evaluated by the use of written examinations. In clinical clerkships, evaluations are based both on written examinations and on the judgment of faculty and residents who have supervised the students.

Parts I and II of the certification sequence of the National Board of Medical Examiners are used by many U.S. schools for both student and course evaluation (Table 19). Part I is optional at only 29 schools. At the remainder of the schools, students must take the examination. At 62 schools, Part I must be passed for promotion or graduation. Taking Part II is optional at 36 schools. At 48 schools, students are required to pass Part II of the examination to graduate.

Career Plans of Graduates

After graduation from medical school, students undertake three or more years of education and training in a specialty. About three quarters of the U.S. graduating seniors who responded to the AAMC's Graduation Questionnaire in 1983 indicated that they had definitely decided to be certified in a specialty (Table 20). The largest proportion (50.7 percent) of 1983 graduates planned careers in nonsurgical specialties that will involve them in direct patient care. Almost a third (31.6 percent) planned to become certified in a surgical specialty. The balance, 17.6 percent, planned to be specialists who usually practice in a hospital and provide supportive diagnostic and therapeutic services to physicians and their patients.

Table 21 shows the careers planned at the time of graduation by the 10,399 respondents to the questionnaire who answered the question. Almost one fourth (24.6 percent) aspire to full-time academic appointments. Close to two thirds (61.7 percent) planned to enter private clinical practice, and 12.8 percent planned careers in salaried clinical positions.

Students' Perceptions of Their Education

Graduating seniors were asked about whether they believed the time devoted to selected areas of their education was excessive, appropriate, or inadequate. More than one third of the 1983 graduates believed that the time devoted was inadequate in 12 of 21 selected areas (Table 22). Between 35 and 50 percent believed there was inadequate time devoted to the management of patients' socioeconomic, educational, and emotional problems; patient follow-up; care of ambulatory patients; care of elderly patients; public health and community medicine; medical record-keeping; and self-evaluation and independent learning. One half to two thirds believed that inadequate time was devoted to research techniques, preventive care, nutrition, practice management, and medical care cost control.

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TABLE 1

Number of Faculty Members, Students, and Graduates in 127 U.S. Medical Schools, 1982–83

School	No. of Full-Time Faculty Members			No. of Medical Students Enrolled	No. of 1983 Graduates
	Basic Science	Clinical Science	Total		
Alabama					
Alabama	205	534	739	660	165
South Alabama	62	87	149	270	71
Arizona					
Arizona	91	257	348	356	81
Arkansas					
Arkansas	82	215	297	546	129
California					
California/Davis	57	196	253	392	87
California/Irvine	64	233	297	394	95
California/Los Angeles	139	667	806	679	166
California/San Diego	46	359	405	504	119
California/San Francisco	131	580	711	638	151
Loma Linda	88	443	531	563	137
Southern California	132	724	856	585	146
Stanford	77	317	394	405	91
Colorado					
Colorado	118	382	500	518	121
Connecticut					
Connecticut	121	306	427	340	84
Yale	117	460	577	460	98
District of Columbia					
Georgetown	82	360	442	817	201
George Washington	77	207	284	613	151
Howard	95	183	278	500	117
Florida					
Florida	118	321	439	466	112
Miami	151	498	649	631	178
South Florida	49	114	163	294	8
Georgia					
Emory	87	503	590	479	116
Medical College of Georgia	111	297	408	725	180
Mercer	16	19	35	24	0*
Morehouse	25	11	36	79	0*
Hawaii					
Hawaii	73	48	121	274	63
Illinois					
Chicago Medical	63	167	230	634	148
Chicago/Pritzker	130	299	429	431	114
Illinois	152	298	450	1,357	338
Loyola/Stritch	68	185	253	438	36
Northwestern	129	259	388	701	181
Rush	77	209	286	517	124
Southern Illinois	104	126	230	236	73

* First class not yet graduated.

TABLE 1—(Continued)

School	No. of Full-Time Faculty Members			No. of Medical Students Enrolled	No. of 1983 Graduates
	Basic Science	Clinical Science	Total		
Indiana					
Indiana	236	317	553	1,199	275
Iowa					
Iowa	126	386	512	707	175
Kansas					
Kansas	112	281	393	815	191
Kentucky					
Kentucky	85	229	314	419	101
Louisville	87	231	318	547	137
Louisiana					
Louisiana/New Orleans	161	324	485	727	173
Louisiana/Shreveport	56	102	158	403	99
Tulane	78	235	313	602	150
Maryland					
Johns Hopkins	142	610	752	481	121
Maryland	113	310	423	709	172
Uniformed Services	157	551	708	572	121
Massachusetts					
Boston	75	246	321	604	147
Harvard	346	1,896	2,242	666	167
Massachusetts	101	231	332	412	92
Tufts	77	181	258	597	145
Michigan					
Michigan	166	494	660	956	239
Michigan State	254	280	534	433	115
Wayne State	112	239	351	1,019	256
Minnesota					
Mayo	97	704	801	161	40
Minnesota/Duluth	42	2	44	96	0†
Minnesota/Minneapolis	211	698	909	1,066	271
Mississippi					
Mississippi	87	184	271	594	137
Missouri					
Missouri/Columbia	72	193	265	446	113
Missouri/Kansas City	43	375	418	371	84
Saint Louis	122	288	410	611	147
Washington	156	565	721	533	125
Nebraska					
Creighton	52	121	173	459	109
Nebraska	51	226	277	621	136
Nevada					
Nevada	25	37	62	188	42
New Hampshire					
Dartmouth	67	247	314	239	5
New Jersey					
UMDNJ/New Jersey Medical	108	331	439	677	161

† Degree granted by Minnesota/Minneapolis.

School	No. of Full-Time Faculty Members			No. of Medical Students Enrolled	No. of 1983 Graduates
	Basic Science	Clinical Science	Total		
UMDNJ/Rutgers	68	168	236	472	104
New Mexico					
New Mexico	75	188	263	300	69
New York					
Albany	69	147	216	516	128
Albert Einstein	205	881	1,086	724	189
Columbia	124	618	742	605	150
Cornell	103	810	913	435	121
Mount Sinai	176	758	934	462	130
New York	187	453	640	711	171
New York Medical	99	525	624	753	197
Rochester	189	473	662	394	91
SUNY/Buffalo	111	113	224	562	134
SUNY/Downstate	103	267	370	910	218
SUNY/Stony Brook	157	501	658	343	57
SUNY/Upstate	71	210	281	596	151
North Carolina					
Bowman Gray	102	292	394	429	102
Duke	187	593	780	494	121
East Carolina	58	100	158	201	41
North Carolina	221	394	615	639	158
North Dakota					
North Dakota	42	46	88	206	38
Ohio					
Case Western Reserve	145	758	903	603	165
Cincinnati	129	560	689	766	187
Medical College of Ohio	87	136	223	472	47
Northeastern Ohio	75	339	414	340	70
Ohio State	152	259	411	837	131
Wright State	69	109	178	398	95
Oklahoma					
Oklahoma	87	388	475	698	166
Oral Roberts	39	26	65	160	26
Oregon					
Oregon	71	190	261	438	115
Pennsylvania					
Hahnemann	92	272	364	754	178
Jefferson	73	395	468	887	211
Medical College of Pennsylvania	67	200	267	456	120
Pennsylvania	216	685	901	664	148
Pennsylvania State	80	191	271	387	99
Pittsburgh	112	560	672	548	130
Temple	115	276	391	727	180
Puerto Rico					
Caribe/Cayey	25	103	128	284	74
Ponce	23	37	60	177	32
Puerto Rico	76	225	301	579	136
Rhode Island					
Brown	77	235	312	266	63

School	No. of Full-Time Faculty Members			No. of Medical Students Enrolled	No. of 1983 Graduates
	Basic Science	Clinical Science	Total		
South Carolina					
Medical University of South Carolina	148	285	433	638	151
South Carolina	41	59	100	172	33
South Dakota					
South Dakota	35	64	99	232	50
Tennessee					
East Tennessee State	45	86	131	200	26
Meharry	53	99	152	414	109
Tennessee	106	285	391	773	179
Vanderbilt	170	316	486	420	105
Texas					
Baylor	211	717	928	667	170
Texas A&M	64	253	317	134	32
Texas/Dallas	183	415	598	816	204
Texas/Galveston	163	343	506	792	191
Texas/Houston	107	295	402	814	193
Texas/San Antonio	153	344	497	803	191
Texas Tech	83	169	252	371	77
Utah					
Utah	116	358	474	410	107
Vermont					
Vermont	75	160	235	377	93
Virginia					
Eastern Virginia	42	116	158	297	92
Medical College of Virginia	177	404	581	672	161
Virginia	131	341	472	553	132
Washington					
Washington	261	726	987	729	169
West Virginia					
Marshall	30	61	91	158	36
West Virginia	88	208	296	343	80
Wisconsin					
Medical College of Wisconsin	97	459	556	799	193
Wisconsin	99	361	460	653	157
Total	13,589	41,383	54,972	66,886	15,801

SOURCE: AAMC Institutional Profile System.

TABLE 2

Number of Faculty Members, Medical Students, and Graduates in 16 Canadian Medical Schools, 1982–83

School	No. of Full-Time Faculty Members			No. of Medical Students Enrolled	No. of 1983 Graduates
	Basic Science	Clinical Science	Total		
Alberta					
Alberta	98	126	224	471	118
Calgary	68	111	179	216	68
British Columbia					
British Columbia	114	190	304	463	92
Manitoba					
Manitoba	83	210	293	388	104
Newfoundland					
Memorial	49	77	126	224	55
Nova Scotia					
Dalhousie	82	161	243	381	94
Ontario					
McMaster	56	265	321	308	100
Ottawa	58	187	245	336	87
Queen's	76	189	265	310	75
Toronto	209	583	792	988	243
Western Ontario	120	228	348	421	103
Quebec					
Laval	82	79	161	649	155
McGill	107	347	454	631	152
Montreal	97	216	313	998	194
Sherbrooke	43	133	176	408	95
Saskatchewan					
Saskatchewan	72	140	212	300	61
Total	1,414	3,242	4,656	7,492	1,796

SOURCE: Association of Canadian Medical Colleges. *Canadian Medical Education Statistics.* Ottawa, Ontario, Canada: Association of Canadian Medical Colleges, 1983.

TABLE 3

Teaching Responsibilities of U.S. and Canadian Medical School Faculties, 1981–82

Group	Enrollment	
	U.S.	Canada
Medical students	66,484	7,435
Residents	50,381	6,532
Graduate students in basic sciences	16,701	2,068
Clinical fellows	7,123	334
Total	140,689	16,369

SOURCES: AAMC Institutional Profile System.
Association of Canadian Medical Colleges. *Canadian Medical Education Statistics.* Ottawa, Ontario, Canada: Association of Canadian Medical Colleges, 1983.

TABLE 4

Sources of Funding for 127 U.S. Medical Schools, 1981-82

Sources of Funding	Dollars (in millions)
Federal research	1,578
Other federal (nonservice)*	415
State and local government (nonservice)*	1,617
Tuition and student fees	413
Medical services	2,140
Other	1,054
Total	7,217

* Includes indirect cost recoveries.

SOURCE: AAMC Institutional Profile System.

TABLE 5

Research Expenditures in 123 U.S. and 16 Canadian Medical Schools, 1981-82

Dollars (in millions)	No. of Schools	
	U.S.*	Canada
0-2	29	—
2.1-4	17	1
4.1-6	20	1
6.1-8	13	4
8.1-10	7	—
10.1-12	4	3
12.1-14	1	—
14.1-16	5	2
16.1-18	4	2
18.1-20	3	—
20.1-22	3	—
22.1-24	2	—
24.1-26	3	—
26.1-28	6	2
28.1-30	—	1
30.1-32	1	—
32.1-34	1	—
34.1-36	2	—
36.1-38	—	—
38.1-40	1	—
40.1-42	—	—
42.1-44	—	—
44.1-46	—	—
46.1-48	—	—
48.1-50	—	—
50.1-52	1	—
Total 1,162.0	123	16

* Data not available for four of 127 U.S. schools.

SOURCES: AAMC Institutional Profile System. Association of Canadian Medical Colleges. *Canadian Medical Education Statistics.* Ottawa, Ontario, Canada: Association of Canadian Medical Colleges, 1983.

TABLE 6

College Major of Applicants to U.S. Medical Schools, 1983-84

College Major	Total Applicants		Accepted Applicants	
	No.	Percent	No.	Percent
Biological sciences	16,008	45	7,276	42
Physical sciences	7,939	23	4,458	26
Nonscience areas	3,483	10	1,769	10
Nursing, pharmacy, and other health professions	1,306	4	455	3
Mixed disciplines	1,903	5	985	6
Other or no major	4,561	13	2,266	13
Total	35,200	100	17,209	100

SOURCE: Association of American Medical Colleges. *Medical School Admission Requirements, 1985-86, United States and Canada.* Washington, D.C.: Association of American Medical Colleges, 1984.

TABLE 7

Distribution of All Applicants and Accepted Applicants Entering U.S. Medical Schools, 1983–84, According to Grade Point Averages

Grade Point Average	Total Applicants		Accepted Applicants	
	No.	Percent	No.	Percent
4.0	286	<1	246	2
3.30–3.99	17,311	56	11,487	74
3.00–3.29	7,094	23	2,411	15
2.30–2.99	5,810	19	1,279	8
2.00–2.29	475	1	51	<1
0.00–1.99	110	<1	1	<1
Total	31,086*	100	15,475	100

* Number of applicants for whom both GPA and MCAT scores were available.

SOURCE: Association of American Medical Colleges. *Medical School Admission Requirements, 1985–86, United States and Canada.* Washington, D.C.: Association of American Medical Colleges, 1984.

TABLE 8

Colleges and Universities Providing an Average of Five or More Applicants Per Year in 1981, 1982, and 1983 and Matriculants

Range of Applicants	No. of Colleges/ Universities	Applicants		Matriculants	
		No.	Percent	No.	Percent
5–9	230	1,591	4	524	3
10–24	276	4,200	12	1,557	9
25–49	153	5,235	15	2,267	14
50–99	95	6,625	19	3,177	19
100–199	51	7,218	20	3,583	22
200–299	25	5,761	16	3,017	18
300 or more	9	3,197	9	1,832	11
Subtotal	839	33,827	95	15,957	96
Other colleges	858	2,059	5	612	4
Total	1,697	33,886	100	16,569	100

SOURCE: AAMC Division of Student Services.

TABLE 9

Range of Colleges and Universities from Which U.S. Medical Schools Received Matriculants in 1983

Range of Colleges and Universities	No. of Medical Schools*
1–10	1
11–20	5
21–30	19
31–40	14
41–50	21
51–60	26
61–70	16
71–80	10
81–90	11
91–100	1
101–110	2

* Data not available for one of the 127 U.S. medical schools.

SOURCE: AAMC Division of Student Services.

TABLE 10

Range of Weeks in 141 U.S. and Canadian Medical School Preclinical Curricula, 1983–84

Range of Weeks	No. of Schools*
41–50	1
51–60	8
61–70	48
71–80	64
81–90	13
91–100	3
101–110	3
111–120	1

* Data not available for two of the 143 schools.

SOURCE: *1983–84 AAMC Curriculum Directory.*

TABLE 11

Range of Scheduled Hours of Instruction in Preclinical Curricula Devoted to Lectures, Conferences, and Laboratories in U.S. and Canadian Medical Schools, 1983–84*

Lectures		Conferences		Laboratories		All Instruction†	
Range of Hours	No. of Schools	Range of Hours	No. of Schools	Range of Hours	No. of Schools	Range of Hours	No. of Schools
401–500	1	0–50	18	61–120	2	1,000–1,115	1
501–600	2	51–100	17	121–180	2	1,116–1,230	1
601–700	2	101–150	19	181–240	4	1,231–1,345	6
701–800	21	151–200	16	241–300	10	1,346–1,460	5
801–900	25	201–250	19	301–360	21	1,461–1,575	10
901–1,000	27	251–300	16	361–420	17	1,576–1,690	18
1,001–1,100	15	301–350	7	421–480	28	1,691–1,805	23
1,101–1,200	13	351–400	7	481–540	9	1,806–1,920	34
1,201–1,300	10	401–450	1	541–600	10	1,921–2,035	14
1,301–1,400	5	451–500	2	601–660	10	2,036–2,105	8
1,401–1,500	—	501–550	—	661–720	8	2,106–2,220	5
1,501–1,600	1	551–600	1	721–780	2	2,221–2,335	3
1,601–1,700	1	601–650	—	781–840	1	2,336–2,450	5
Total	123		123‡		124		133

* Data not available in each area of or in all instruction for all 143 schools.

† Includes other hours of instruction not devoted to lectures, conferences, or laboratories.

‡ One school schedules 1,642 hours of conferences and no lectures.

SOURCE: *1983–84 AAMC Curriculum Directory.*

TABLE 12

Percent of Total Scheduled Hours of Instruction in the Preclinical Curricula Devoted to Lectures, Conferences, and Laboratories in 124 U.S. and Canadian Medical Schools, 1983–84

Percent of Total Hours	No. of Schools*		
	Lectures	Conferences	Laboratories
0–10	1	68	4
11–20	—	49	28
21–30	—	4	67
31–40	10	3	22
41–50	39	—	3
51–60	45	—	—
61–70	23	—	—
71–80	6	1†	—

* Data not available for 19 of 143 schools.

† One school schedules 1,642 hours of conferences and no lectures.

SOURCE: *1983–84 AAMC Curriculum Directory.*

TABLE 13

Hours of Instruction in Preclinical Disciplines in 143 U.S. and Canadian Medical Schools, 1983–84

Discipline	Range of Hours													Data Not Available	Average Hours	Total Schools
	1–50	51–100	101–150	151–200	201–250	251–300	301–350	351–400	401–450	451–500	501–550	551–600	601–650			
Anatomy	—	—	1	1	2	32	28	23	14	8	4	1	1	28	150	143
Pathology	—	—	12	23	36	16	15	5	2	—	—	—	—	34	233	143
Physiology	—	4	39	51	15	3	2	—	—	—	—	—	—	29	167	143
Microbiology	—	10	41	51	10	2	—	—	—	—	—	—	—	29	155	143
Biochemistry	—	15	62	34	3	1	—	—	—	—	—	—	—	28	137	143
Pharmacology	1	19	65	25	3	—	—	—	—	—	—	—	—	30	129	143
Neurosciences*	5	26	38	5	1	—	—	—	—	—	—	—	—	28	109	103
Behavioral science†	19	51	26	7	2	—	—	—	—	—	—	—	—	28	91	133
Preventive medicine/epidemiology‡	51	24	5	3	—	—	—	—	—	—	—	—	—	28	51	111
Genetics§	62	3	—	—	—	—	—	—	—	—	—	—	—	28	27	93

* Not offered in 40 schools. † Not offered in 10 schools. ‡ Not offered in 32 schools. § Not offered in 50 schools.

SOURCE: *1983–84 AAMC Curriculum Directory.*

TABLE 14

Basic Science Electives Taken by 10,279 Students Graduating from U.S. Medical Schools in 1983

Basic Science Elective	Students Taking Elective*	
	No.	Percent
Anatomy	1,182	11.5
Biochemistry	578	5.6
Genetics	303	2.9
Microbiology	536	5.2
Neurosciences	600	5.8
Pathology	1,663	16.2
Pharmacology	631	6.1
Physiology	588	5.7

* Number and percent are based on students who indicated participation in *at least one* of the listed activities; 202 of the graduates reported taking no elective. SOURCE: 1983 AAMC Graduation Questionnaire.

TABLE 15

Weeks of Required Clerkships in 139 U.S. and Canadian Medical Schools, 1983–84

Discipline	No. of Weeks																								Average Weeks	Total Schools*
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
Medicine	—	—	—	—	—	—	—	12	4	7	8	82	1	5	3	9	3	1	—	2	—	—	1	1	12	139
Surgery	—	—	—	1	—	2	—	19	7	17	5	66	8	5	1	5	—	2	—	—	—	1	—	—	11	139
Pediatrics	—	—	—	4	4	37	10	66	6	7	1	3	1	—	—	—	—	—	—	—	—	—	—	—	8	139
Obstetrics/ gynecology	—	—	—	6	5	57	7	55	5	2	1	1	—	—	—	—	—	—	—	—	—	—	—	—	7	139
Psychiatry	—	1	—	15	11	58	7	46	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	6	139
Family medicine†	—	3	1	23	1	12	1	14	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	5	56
Neurology‡	—	10	7	41	3	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	64

* Data not available for four of 143 schools. † Not offered in 83 schools. ‡ Not offered in 75 schools. SOURCE: *1983–84 AAMC Curriculum Directory.*

TABLE 16

Range of Weeks Available for Electives in Senior Year of 136 U.S. and Canadian Medical Schools, 1983–84

Weeks	No. of Schools*
1–4	1
5–8	8
9–12	12
13–16	15
17–20	14
21–24	26
25–28	16
29–32	22
33–36	10
37–40	8
41–44	3
45–48	1

* Data not available for seven of 143 schools.

SOURCE: *1983–84 AAMC Curriculum Directory.*

TABLE 17

Electives in Clinical Specialties Taken by 10,279 Students Graduating from U.S. Medical Schools in 1983

Clinical Specialties	Students Taking Elective*	
	No.	Percent
Anesthesiology	2,998	29.2
Community medicine	823	8.0
Dermatology	3,160	30.7
Emergency medicine	4,250	41.3
Family medicine	2,398	23.3
Intensive care medicine	2,438	23.7
Internal medicine	3,004	29.2
Cardiology	6,398	62.2
Endocrinology	1,704	16.6
Gastroenterology	1,664	16.2
Hematology	1,503	14.6
Infectious diseases	3,232	31.4
Nephrology	2,741	26.7
Oncology	1,022	9.9
Pulmonary diseases	2,340	22.8
Rheumatology	1,042	10.1
Other internal medicine specialty	701	6.8
Neurology	2,489	24.2
Obstetrics/gynecology	1,643	16.0
Obstetrics/gynecology subspecialty	630	6.1
Ophthalmology	2,131	20.7
Otolaryngology	1,385	13.5
Pediatrics	1,821	17.7
Adolescent medicine	267	2.6
Neonatology	707	6.9
Other pediatric subspecialty	1,344	13.1
Physical medicine and rehabilitation	421	4.1
Preventive medicine	158	1.5
Psychiatry	1,286	12.5
Public health	219	2.1
Radiology	6,562	63.8
General surgery	1,574	15.3
Neurological surgery	510	5.0
Orthopedic surgery	1,922	18.7
Plastic surgery	594	5.8
Thoracic surgery	502	4.9
Urology	868	8.4
Other surgical specialty	864	8.4

* Number and percent are based on students who indicated participation in *at least one* of the listed activities; 202 of the graduates reported taking no elective.

SOURCE: 1983 AAMC Graduation Questionnaire.

TABLE 18

Grading Systems Used in 127 U.S. Medical Schools, 1983–84

Grading System	Basic Sciences		Clinical Sciences		Electives	
	No.	Percent	No.	Percent	No.	Percent
Honors/pass/fail or equivalent	60	47.3	63	50.0	63	50.8
Pass/fail or equivalent	21	16.5	17	13.5	38	30.6
Letter or number grades	46	36.2	46	36.5	23	18.6
Total	127	100.0	126*	100.0	124†	100.0

* Data not available for one of 127 schools.
† Data not available for three of 127 schools.
SOURCE: *1983–84 AAMC Curriculum Directory.*

TABLE 19

Use of National Board of Medical Examiners' Certification Examinations in 127 U.S. Medical Schools, 1983–84

Use by Schools	Part I Examination		Part II Examination	
	No.	Percent	No.	Percent
Optional	29	22.8	36	28.4
Student must record score	35	27.6	41	32.3
Student must record passing total score	59	46.5	—	—
Student must record passing score in each section	3	2.4	—	—
Student must record passing score to graduate	—	—	48	37.8
To determine final course grades	18	14.2	16	12.6

SOURCE: *1983–84 AAMC Curriculum Directory.*

TABLE 20

Specialty Choice of 7,705 Students Graduating from U.S. Medical Schools in 1983

Specialty Choice	Graduates*	
	No.	Percent
Allergy and immunology	12	0.2
Anesthesiology	401	5.2
Critical care	21	0.3
Colon and rectal surgery	3	0.1
Dermatology	92	1.2
Emergency medicine	211	2.7
Family practice	1,368	17.8
Internal medicine	982	12.7
Cardiovascular diseases	110	1.4
Critical care	10	0.1
Endocrinology and metabolism	27	0.3
Gastroenterology	47	0.6
Hematology	19	0.2
Infectious diseases	25	0.3
Medical oncology	25	0.3
Nephrology	12	0.2
Pulmonary diseases	9	0.1
Rheumatology	16	0.2
Neurological surgery	85	1.1
Nuclear medicine	3	0.1
Obstetrics/gynecology	524	6.8
Gynecologic oncology	22	0.3
Maternal and fetal medicine	25	0.3
Reproductive endocrinology	42	0.5
Ophthalmology	296	3.8
Orthopedic surgery	510	6.6
Otolaryngology	180	2.3
Pathology	240	3.1
Pediatrics	501	6.5
Cardiology	19	0.2
Critical care	4	0.1
Endocrinology	2	0.1
Hematology/oncology	21	0.3
Nephrology	2	0.1
Neonatal/perinatal medicine	14	0.2
Physical medicine and rehabilitation	67	0.9
Plastic surgery	92	1.2
Preventive medicine	11	0.1
Psychiatry	327	4.2
Child psychiatry	60	0.8
Neurology	113	1.5
Child neurology	10	0.1
Radiology	24	0.3
Diagnostic radiology	406	5.3
Therapeutic radiology	47	0.6
Surgery	427	5.5
Critical care	4	0.1
Pediatric surgery	27	0.3
Thoracic surgery	72	0.9
Urology	138	1.8
Total	7,705	99.9†

* Graduates who indicated they had definitely decided on certification in a specialty.

† Sum does not equal 100.0 due to rounding.

SOURCE: 1983 AAMC Graduation Questionnaire.

TABLE 21

Career Plans of 10,399 Students Graduating from U.S. Medical Schools in 1983

Career Plans	Graduates	
	No.	Percent
Full-time academic faculty member		
Basic science teaching and research	118	1.1
Clinical science teaching and research	2,446	23.5
Salaried research scientist		
Basic medical sciences	18	0.2
Clinical sciences	47	0.5
Private clinical practitioner		
Alone	411	4.0
In participation with one other physician	1,120	10.8
In a group of three or more physicians	3,684	35.4
Undecided among the other private practice options	1,194	11.5
Salaried clinical practitioner, employed by		
Hospital	673	6.5
Prepaid group clinic	274	2.6
State or federal agency	388	3.7
Administrator—no practice	26	0.2
Total	10,399	100.0

SOURCE: 1983 AAMC Graduation Questionnaire.

TABLE 22

Perceptions of 10,481 Graduates in 1983 of the Time Devoted to Selected Areas of Instruction in U.S. Medical Schools

Instruction Area	Percentage of Graduates on Perception of Time			
	Excessive	Appropriate	Inadequate	No Response
Basic medical sciences information	19.8	73.4	6.1	0.7
Clinical sciences information	1.3	81.2	16.8	0.7
Behavioral sciences information	13.5	62.5	23.1	0.9
Research techniques	4.8	42.8	51.2	1.2
Patient interviewing skills	5.9	82.5	10.9	0.7
Diagnostic skills	1.3	69.6	28.4	0.7
Therapeutic management	1.1	71.9	26.1	0.9
Management of patient's socioeconomic, educational, and emotional problems	4.0	49.4	45.7	0.9
Patient follow-up	0.7	54.8	43.6	0.9
Care of hospitalized patients	6.5	89.3	3.5	0.7
Care of ambulatory patients	1.1	63.1	35.1	0.7
Care of the elderly	1.8	59.4	37.9	0.9
Preventive care	1.6	37.9	59.6	0.9
Public health and community medicine	4.9	46.8	47.1	1.2
Drug effects and clinical pharmacology	2.2	72.3	24.7	0.8
Nutrition	1.2	38.3	59.7	0.8
Medical record-keeping skills	2.2	57.2	39.8	0.8
Practice management skills	0.5	30.0	68.5	1.0
Medical care cost control	0.8	32.8	65.5	0.9
Physician self-evaluation and independent learning skills	0.7	57.3	41.0	1.0
Teamwork with other health professionals	1.7	79.3	18.2	0.8

SOURCE: 1983 AAMC Graduation Questionnaire.

Report of the Working Group On Essential Knowledge

The study of medicine is a cumulative, cyclic process that involves students in continued learning throughout their professional careers. During their medical school years, students must assimilate and integrate a great breadth of information. As they advance from this general phase of learning to the specialized graduate phase, they build upon the knowledge they previously acquired to develop a sophisticated understanding of the complex problems they are expected to solve.

The rapid rate of increase in biomedical knowledge makes it difficult, if not impossible, to determine, once and for all, the essential knowledge* that will equip future physicians to practice medicine. Yet, medical school faculties are responsible for medical student programs and, thus, must formulate criteria for the ongoing determination of the specific knowledge essential for students' general professional education.

Although the faculties of individual medical school departments are responsible for graduate basic science programs, specialty residencies, and fellowships, the collective faculty determines the essential knowledge that medical students are to acquire. Each discipline or specialty rests upon a unique body of knowledge that is an element of that larger body of information defined as essential knowledge. In determining the content and scope of essential knowledge, faculty members must collaborate in their decision making with colleagues from within their respective departments and with colleagues from other departments.

If faculties base the criteria for essential knowledge on the principle that continued learning is necessary for the successful, lifelong practice of medicine, they can more easily control the content and scope of that knowledge at each stage of medical education. Controlling the content of essential knowledge at each stage of medical students' education is not tantamount to diluting the scientific base of medicine. Students must continue to learn scientific concepts and principles throughout their careers. They cannot assimilate all of the scientific knowledge they will need during the preclinical curriculum. That stage of their learning should provide the foundation upon which their future scientific learning can be built, and the content should be limited to providing such a foundation.

In order to keep up with the rapid growth of knowledge in the biomedical sciences, students must learn the skills necessary for continuous, independent learning. To develop this capacity, they must be actively involved in their own education. Faculty members can help students meet these demands by acquiring an awareness of (*a*) the general educational needs of students, and (*b*) the implications that these needs have for the determination of the content and scope of essential knowledge and for the employment of methods for teaching that knowledge:

1. Students need to be active partici-

The Report of the Working Group on Essential Knowledge was submitted to the Project Panel in June 1983.

* The working group defined essential knowledge as that body of information that students need to function successfully and independently at each stage of their education and to continue their development as physicians.

pants in the learning process; thus, faculty members should employ teaching methods that—unlike lectures in which the student is a passive learner—encourage active involvement of students.

2. Students need time to read and to learn in their own way; as a consequence, the faculty should fix scheduled curriculum hours at levels that allow for such independence.

3. Students need opportunities to work cooperatively with other students and faculty members; therefore, faculty members should structure the educational program in ways that provide such opportunities.

The evaluation system is an especially critical, important component of the medical education program. To be effective, evaluation must be consistent with and contribute to the goals of medical education. As with the determination of the scope and content of essential knowledge, each medical school faculty is responsible for setting standards and evaluating the students' attainment of them. Although it is important to assess the level of factual biomedical knowledge students have acquired, evaluations should also encompass their approaches to obtaining and using knowledge.

College Preparation

There were 839 colleges and universities that contributed an average of five or more applicants per year to medical school during the period of 1981, 1982 and 1983. Half of all matriculants to U.S. medical schools for those years came from 81 large institutions, 70 of which have medical schools. The other half of the matriculants for these three years came from 1,238 institutions. A total of 499 colleges supply an average of two or fewer matriculants per year.† The resources and educational emphases of this multitude of institutions are as diverse as their students. The advantages to be derived from this diversity are lost if applicants are required to follow a narrowly defined sequence of college courses.

ADMISSION REQUIREMENTS

The study of medicine should be open to students with diverse sociocultural backgrounds and college majors. Thus, medical school admission requirements should not dictate the educational programs of students aspiring to enter medical school. Medicine is a profession that needs and can accommodate students with diverse talents and interests.

Students do need to have a preparatory science education sufficient to undertake medical school basic science courses. One year of biology, two years of chemistry, and one year of physics are commonly required (Table 1). While achieving these specific requirements will not guarantee that students have gained the knowledge essential for undertaking basic science courses, these requirements are reasonable. However, some medical faculties strongly recommend other college courses (Table 2). Students tend to interpret these courses that are "strongly recommended" as required courses. On the average, each medical school applicant applies to nine schools. To meet the various requirements and recommendations of the many schools to which they may apply, students are all too often left with little opportunity to choose courses in which they might have a particular interest.

The working group recommends that medical school faculties limit admission requirements to those necessary for successful study in their institutions. Faculties should determine these requirements by explicitly delineating the scientific knowledge that is essential for admission to medical school.

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† Source: AAMC Division of Student Services.

TABLE 1

Summary of Courses Required for Students Planning To Enter Medical School, 1982–83
(n = 126 Schools)

Courses	No. of Schools
Biological Science	
Biology (unspecified)	60
General biology	12
Genetics	6
Zoology	1
General biology or zoology	34
Zoology or botany	1
Biological science	9
Advanced biology	6
Chemistry	
Biochemistry	2
Chemistry (unspecified)	11
General chemistry	32
Inorganic chemistry	75
Organic chemistry	118
Physical chemistry or —quantitative analysis	1
Qualitative analysis	2
Quantitative analysis	8
Humanities	
English	56
Foreign language	9
Humanities (unspecified)	6
English composition	6
English composition and literature	16
Liberal arts	3
Mathematics	
Analytical geometry	1
Calculus	19
College algebra	5
College mathematics	16
Mathematics (unspecified)	10
Trigonometry	2
Statistics	2
Statistics or calculus	1
Physics	
General physics	81
Physics (unspecified)	36
Social and Behavioral Sciences	
Anthropology	3
Behavioral science (unspecified)	10
Psychology	7
Social science	9
Sociology	4
Ethnology	1

Source: *Medical School Admission Requirements 1982–83*. Washington, D.C.: Association of American Medical Colleges, 1981.

TABLE 2

Summary of Courses 'Recommended, Strongly Recommended, Highly Recommended, Urged, Highly Regarded, and Strongly Suggested' for Students Planning To Enter Medical School, 1982–83
(n = 126 Schools)

Courses	No. of Schools
Biological Sciences	
Advanced biology	7
Cell biology	4
Comparative vertebrate anatomy	6
Embryology	13
Genetics	14
Histology	1
Microbiology	1
Molecular biology	1
Cell physiology	1
Cell development	1
Developmental biology	2
Physiology	1
Zoology	1
Chemistry	
Advanced chemistry	3
Advanced organic	1
Biochemistry	10
Quantitative or analytical	7
Physical chemistry	16
Mathematics	
Calculus	17
Computer science	1
Statistics	3
Mathematics (unspecified)	9
Humanities	
Art and fine arts	6
Foreign language	5
Spanish	2
English	10
Liberal arts	5
Literature	5
Religion or philosophy	6
Humanities (unspecified)	19
Social and Behavioral Sciences	
Anthropology	3
Behavioral science (unspecified)	7
Economics	2
History	5
Political science	1
Psychology	10
Sociology or social science	22

Source: *Medical School Admission Requirements 1982–83*. Washington, D.C.: Association of American Medical Colleges, 1981.

This recommendation is based upon the conviction that college education should provide students with a broad liberal education and that medical school faculties inhibit the achievement of this goal if they either implicitly or explicitly expect students to follow a narrowly defined sequence of college courses as preparation for medical school.

The objective of a liberal education is to develop a person's ability to approach issues and problems through the rational use of concepts acquired from diverse disciplines. A student cannot achieve this objective by following a single specified sequence of required courses. Thus, widespread preoccupation of students with developing a college record that they consider necessary for admission to medical school runs counter to the goal of a liberal education.

MEDICAL COLLEGE ADMISSION TEST

College and medical school faculties were extensively involved in the 1977 revision of the Medical College Admission Test (1) to identify material taught in commonly required college science courses that would provide sufficient preparation for the study of the basic sciences in medical school. Thus, the present Medical College Admission Test measures the extent to which students have achieved the scientific knowledge to prepare them for successful study in the first two years of medical school.

Experience with the Medical College Admission Test since 1977 has shown that students who meet the minimum science course requirements generally score well enough to be competitive applicants for medical school. Studies of the correlation between students' performance on the Medical College Admission Test and their subsequent achievement in the basic sciences in medical school demonstrate that the examination is a reliable indicator of their achievement (2, 3). The reading analysis, quantitative analysis, and problem-solving sections of the Medical College Admission Test assess skills gained in the study of a variety of disciplines, including mathematics. Faculties can obtain estimates of students' preparation for advanced study from scores on these sections. The rational use of these scores in evaluating students reduces the need to require courses beyond the absolute minimum.

The working group recommends that medical school faculties become familiar with the content of the Medical College Admission Test and base their particular uses of it on a reasonable delineation of the minimum knowledge and intellectual skills necessary to undertake the study of medicine.

GRADES, SCORES, AND SELECTION

Criteria for selection of medical students are established by medical school faculties and, of course, vary. In addition to considering Medical College Admission Test scores, which most medical schools use, they will take into account some or all of the following: the applicant's biographical information, college academic record, personal comments, faculty evaluation, and a personal interview.

The working group recommends that medical school faculties reduce the priority given to high grades and test scores in their selection of students.

Many college students avoid certain courses because they fear that they may not obtain high grades. Both college and medical school faculties foster the belief that admissions committees consider only those students with the highest grades and Medical College Admission Test scores. Yet, research has shown that among medical students who do complete their medical education, the range of college grades and Medical College Admission Test scores is wide and the college majors are diverse (4). Many medical schools publish the mean grade point average and Medical College Admission Test scores of the class that was selected the previous year (5). Potential applicants are likely to interpret these mean scores as the minimum score requirements for selection.

The working group recommends that medical school faculties review the experiences and the records of their students to establish the range of college grades and Medical College Admission Test scores that is indicative of future academic success. It further recommends that faculties publish that information in lieu of mean scores and inform applicants and their advisers that selection factors other than grades and test scores will be given weight in the selection process.

Admission to medical school is commonly thought to be one of the most competitive challenges college students face. Along with frequent exaggerations of the intensity of this competition, this belief tends to induce students to narrow, rather than broaden, their college education. Convincing college students and faculties that medical school faculties truly want a variety of liberally educated students will require much closer communication between college and medical school faculties and a redefinition of the criteria for selection. Medical school faculty members can take the initiative if they are prepared to make a sustained effort to change these deeply held beliefs. They might begin this effort by communicating with faculties at the 81 universities that provide half of the matriculants, 70 of which have medical schools.

THE BACCALAUREATE DEGREE

College faculties too frequently accede to expectations by both students and professional school faculties that college education should prepare students for advanced study in a specific discipline or profession. As a result, college campuses are rife with premature professionalism. Many students do not view college as the opportunity for acquiring a liberal education and instead see it as the beginning of their professional education. They select their course work to ensure entry into a professional field and to make advanced study easier, at least in the early stages. This premature specialization is the cause of mounting concern about the meaning and purpose of the baccalaureate degree.

The Association of American Colleges is redefining the meaning and purpose of baccalaureate degrees (6). Through this effort, participating college faculties have developed the consensus that college graduates should (*a*) possess far more than mere expertise in some area of concentration; (*b*) be able to communicate effectively through writing and speaking and through applying mathematical reasoning and computations; (*c*) possess knowledge that extends across a broad range of disciplines, including the physical and biological sciences, the humanities, the social sciences, and the fine and performing arts; and (*d*) possess a capacity for analytical, critical, and integrative thinking and for problem definition and solution.

If college faculties define these accomplishments as criteria for granting the baccalaureate degree, they will have to counter the resistance of students and professional school faculty members who believe strongly that college should be a prelude to entry into a profession.

The working group recommends that college faculties establish criteria for the baccalaureate degree that go beyond the demonstration of expertise in some area of concentration and explain to medical school faculties the range of accomplishments required for granting the degree.

Once college faculties follow this recommendation, two salutary results can be anticipated:

1. College students preparing for the study of medicine will be able to attain a broad liberal education without jeopardizing their chances for admission to medical school.

2. The college faculties will no longer feel constrained to advise students to pursue a series of courses in which they feel candidates must excel to study medicine.

A major obligation of college faculties is to modify their courses as fields advance. For example, organic chemistry, which developed as the carbon chemistry of industrially useful compounds, can now be taught with an emphasis on the carbon chemistry of biological structure and function at the cellular and molecular level.

In summary, college faculties have the authority and responsibility to establish the criteria for granting the baccalaureate degree. Medical school faculties must not usurp this prerogative. They must hold to an absolute minimum course requirements for admission, and they must modify selection criteria that impair opportunities for medical school applicants to obtain a liberal education. College preparation for medicine will then no longer be seen simply as a sequence of prescribed courses.

Medical School

Medical schools have been privileged in their ability to attract intellectually superior students who are capable of learning a large body of knowledge rapidly. For this reason, faculties have not been very selective in teaching medical students.

Fifty years ago the Association of American Medical Colleges Commission on Medical Education stated (7):

> Some of the chief difficulties in medical training arise from efforts to provide instruction in too many subjects in too great detail. These endeavors have created great overloading of the curriculum. The dependence upon sheer memory tends to defeat the development of a scientific attitude and point of view. This makes the application of sound educational methods almost impossible, for the intellectual development of students cannot occur in a breathless, hurried, pressing schedule of assigned exercises.
>
> The methods of presenting subjects, both in the medical sciences and in the clinical departments, are often unsatisfactory. Teachers, graduates, and students agree that topics are presented too frequently from the standpoint of the special interest of the teacher and from the aspect of technical details.

The observations of that commission would be even more applicable to medical education in the 1980s when the rate of increase of relevant biomedical knowledge is much greater than it was then. Medical students protest that specialized faculty members believe they must teach all the latest, detailed information in their fields. The result of this informational transmission is to stifle the students' intellectual development and to threaten their natural curiosity. The intensity of preclinical schedules is evident in most U.S. and Canadian medical school curricula. Lectures predominate as the method of instruction and, as a rule, each course is divided among many lecturers.

FACULTY

A 1982 survey of biochemistry departments conducted by the Association of Medical School Departments of Biochemistry revealed that an average of nine faculty members share major responsibility for the medical student biochemistry course and seven more provide occasional lectures. This division of responsibility for courses among many faculty members is uniquely characteristic of medical schools; in undergraduate colleges and in graduate programs, a single faculty member generally teaches a course or seminar.

The working group recommends that medical school faculties examine why courses for medical students are taught by so many faculty members and consider whether fewer faculty members would present a more effective program.

One reason why so many faculty members are involved in teaching is that as basic and clinical sciences have become more complex, faculties have become more specialized to pursue research and to provide advanced diagnostic and therapeutic services. With a cadre of subspecialists—all of whom want to participate to a limited degree in teaching medical students—departments have divided the teaching load among these rich sources of talent. Although such a division of labor appears to be both fair and sensible, it is almost impossible to control the degree of detail the subspecialists teach and to ensure that students learn essential principles and concepts. Course directors or coordinators usually are responsible for organizing and scheduling these courses, but, beyond selecting topics to be covered and recruiting the experts to cover them, they have little control over the content of courses.

In required clerkships and clinical electives, students are exposed to many specialized faculty members who are quite willing to teach students about their specialties or subspecialties either on rounds or in conferences. Since the focus of teaching is dependent on the clinical problems present on a service, students are even less likely to learn essential principles and concepts in the clinical sciences during their clerkships.

This multifaculty approach to teaching medical students is so pervasive and so obstructive to the rational delineation of essential knowledge that it is the primary problem that must be solved if medical school is to provide students with a well integrated general professional education. One solution is to restrict the number of faculty members who have both the authority to determine essential knowledge and the responsibility for teaching it.

The working group recommends that the educational program for medical students be delegated to a selected number of major teachers who have the authority to determine and the responsibility to teach the essential knowledge to be presented to students.

Another reason for the limited involvement of so many faculty members in teaching medical students appears to be insufficient recognition for their teaching efforts. They may be eager to have *brief* exposures to students but few are willing to dedicate themselves to the medical student program. Teaching graduate students and residents complements their research and patient care endeavors, while teaching medical students does not. If a restricted number of faculty members are to dedicate themselves to the general professional education of medical students, the opportunity must be deemed a privilege that carries with it personal recognition and control over the resources needed to mount a high quality program. The administrative and fiscal arrangements needed to accomplish this will vary from institution to institution. The responsibility for its accomplishment lies with deans and departmental chairmen.

The working group recommends that faculty members who dedicate themselves to the medical student program be given appropriate personal recognition for this endeavor and support for the resources to mount a high quality program.

INCREASED SCOPE

The expansion of biomedical knowledge and technology and complex changes in the organization and control of the medical service system are altering the physician's role and responsibilities—they require increasing the range of knowledge necessary for the general professional education of the physician. Physicians are far more able to intervene effectively in human illness than were their counterparts of 50 years ago. New knowledge and technology provide diagnostic and therapeutic opportunities to identify, prevent, and cure diseases previously unrecognized or not amenable to treatment. For the most part, these opportunities have been of benefit, but they have also created ethical, administrative, and financial problems that most physicians are not prepared to address.

The working group recommends that the general professional education of physicians include the study of ethical issues, prevention, the organization and administration of the nation's medical service system, and foreseeable changes in the nature of medical practice.

The general professional education of physicians during medical school is necessarily directed toward breadth; in-depth learning in a narrow field is reserved for graduate medical education. However, the development of the study skills and personal discipline needed to pursue independent learning is augmented if students are required to learn about and to report on an area in some depth.

Most faculty members support the involvement of medical students in research. However, the purpose of this involvement in research is not always made clear. Students frequently approach research experience as an opportunity to learn a limited number of experimental techniques. Direct involvement in original laboratory research for the purpose of advancing knowledge is feasible only for students who extend their medical school experience a year or more. On the other hand, research for the purpose of learning how to locate and appraise original articles and write a report can be accomplished in the usual course of medical school. The quality of such an experience should be judged on the process used and the clarity of reporting rather than on the findings.

The working group recommends that faculties require each student to study a subject area in depth and submit a written report some time during medical school. Close association with a faculty member in this enterprise should be ensured.

The foregoing conclusions and recommendations apply across the entire span of medical school. Specific concerns about delineating and teaching essential knowledge during the preclinical and clinical phases are discussed below.

BASIC SCIENCE

Since the publication in 1910 of Abraham Flexner's *Medical Education in the United States and Canada* (8), medical schools have strongly emphasized education in the sciences. Flexner advocated the scientific method for both the basic sciences and clinical education. Use of the scientific method and understanding of the principles of basic science remain an extremely important part of essential knowledge for the medical student.

Delineating the basic science knowledge necessary for patient care has always been difficult; moreover, the knowledge explosion in the sciences has compounded the difficulty. An almost universal specialization and subspecialization of basic scientists and physicians have resulted, and educational programs in residencies and fellowships have expanded. These changes require a new focus for education in the basic sciences in medical schools.

The working group recommends that

those who are responsible for planning the basic sciences program focus on the development by students of a vocabulary and a conceptual framework on which they may base continued learning. These planners must recognize education in medicine as an iterative process; the depth of students' knowledge will grow as they progress through medical school and residency and enter medical practice.

The basic science curriculum in three quarters of the medical schools is based upon separate disciplines. Essential knowledge in each discipline is, for the most part, determined by departmental faculty members who are experts in their fields. When these specialized educators plan their courses they assume that medical students should have the benefit of the knowledge derived from the latest research in their area of interest. While the idea of determining the essential knowledge by experts from a single discipline is appealing and logical, this practice has contributed to teaching excessive detail in the preclinical phase.

The working group recommends that basic science knowledge considered to be essential be determined through interdisciplinary, collaborative decision making among teachers in basic science and clinical disciplines.

Experiments in medical school curriculum design over the last 30 years have produced at least three models in which essential knowledge has been established by collaborative decision making:

1. The first of these was the organ system curriculum developed at the Western Reserve University School of Medicine (9). In that curriculum the basic sciences are conceptualized in their relation to one another and in the interactions manifested in human systems. Faculty members from both basic science and clinical disciplines determine essential knowledge in interdisciplinary subject committees. The basic science curriculum is a responsibility of the faculty as a whole, not of individual departments.

2. Another method and philosophy of teaching the basic sciences were developed at McMaster University in Hamilton, Ontario, Canada, where basic science education is centered around selected clinical problems (10). Working across disciplines in a collaborative decision-making mode, faculty members develop these problems and determine essential knowledge. Each case is chosen to demonstrate principles and concepts from the basic sciences.

3. Collaborative decision making is also used in the development of pathophysiology courses by faculties in 15 U.S. medical schools. In these schools at least 150 hours of course work that involve cooperation between the basic science and clinical faculties demonstrates the application of scientific principles to the understanding of human disease.

Although these models represent fundamental changes in the design of a basic science curriculum, faculties need not establish an organ system or a problem-based curriculum. Basic science courses can be discipline-based, but the knowledge for which students are held responsible should be reviewed by faculty members from other disciplines, both basic and clinical science.

Students repeatedly need to expand and apply their knowledge in the basic sciences as they progress through their clinical education, which is accomplished through the case method of study. This requires that they observe the manifestations of diseases and integrate what they have learned in the basic sciences to understand the mechanisms of disease. Students who have the knowledge and skills to learn independently can proceed on their own as they study case after case. Students whose initial basic science education fails to equip them with these abilities will not continue to acquire the essential knowledge in the basic sciences they need to stay abreast of new information as they progress through repeated cycles of education.

The working group recommends that teaching methods used in the curriculum foster the development of independent learning skills by medical students.

The Independent Study Program developed at the Ohio State University College of Medicine is a curriculum designed to help medical students become independent learners (11). In the Independent Study Program the students are responsible for determining the pace of their instruction, their immediate learning objectives, and the methods by which to master them. They can select study materials developed by faculties from a variety of sources.

Medical education programs vary a great deal with respect to how many hours of instruction are offered in preclinical curricula, the number of hours students are required to be in class, and the amount of class time that is devoted to lectures. Curricula in which students spend a large proportion of their time in class, especially in lectures, inhibit efforts to learn independently.

The methods faculties use to teach the basic sciences are important in enabling students to develop skills for independent learning: students need time to read, organize, and explore science on their own. They must also have an opportunity to initiate studies rather than simply to respond to requirements for reading and testing. They need time to experiment in how they learn best.

The working group recommends that faculties minimize the amount of time students spend in class and reduce the number of lectures in favor of seminars and laboratories, which encourage interchange of ideas among students and faculty.

CLINICAL SCIENCE

In the clinical sciences, students gain knowledge principally through case studies. Working up and observing patients, students learn directly from the patients. Through conferences and seminars with residents and faculty members, and reading relevant literature, students learn to interpret and integrate what they have learned from patients. For example, students learn about cyanosis by observing cyanotic patients. They learn the probable causes of cyanosis and its manifestations through texts, journal articles, and discussions with teachers. Students also learn to recognize the signs and symptoms of the various causes of cyanosis by examining patients.

On a case-by-case basis, their store of clinical knowledge expands as they rotate through both required and elective clinical clerkships. Because clerkships are provided in a variety of settings and because each patient studied by a clerk is unique, the aggregate learning of the individual student is, to a considerable degree, also unique. Thus, if there is sole dependence on the random exposure of the student to patient cases, the knowledge acquired during clerkships may vary significantly.

The working group recommends that faculty members responsible for the clinical clerkships work together to determine the essential clinical knowledge all students must acquire.

Faculty members from clinical departments who have major teaching responsibility for junior and senior clerks must approach the identification of essential clinical knowledge from three major standpoints: (*a*) the knowledge students must acquire from talking with, observing, and examining patients; (*b*) the knowledge students must acquire from reading and interacting with faculty members and residents; and (*c*) the knowledge students must acquire from interacting with other health professionals.

Clinical education must also be directed toward developing the fundamental vocabulary and skills needed to explore and solve clinical problems. Inevitably, each student will have more knowledge about one organ system or another, but all should acquire the knowledge that is essential to pursue the solution of clinical problems relative to each system at various stages.

In agreeing on essential clinical knowledge for the general professional education of the physician, faculty members must guard against using a standard appropriate to a resident or fellow. For example, while an internal medicine resident or cardiology fellow would be expected to be able to interpret a phonocardiogram, a junior clerk should study normal and abnormal heart sounds with a stethoscope. Many patients in teaching hospitals have complex problems requiring the use of sophisticated diagnostic and therapeutic technology. Special efforts are required to teach junior clerks the essential knowledge that can be gained through interviews, physical examinations, and relatively simple laboratory procedures. Simply assigning them to the medical service team will not ensure that they acquire basic knowledge for their general professional education.

The working group recommends that faculty members in each medical specialty differentiate knowledge essential for medical students from knowledge essential for residents and fellows. They should examine the content of lectures and conferences to ensure that it meets the standards for knowledge essential to medical students. Residents who teach medical students must understand what knowledge in their specialties is considered essential for students.

Clerkship settings—Hospital services are necessarily organized and staffed to provide diagnostic and therapeutic services to patients who have acute diseases or acute, intercurrent manifestations of chronic diseases. This organizational pattern may not provide the optimal milieu for students to acquire essential clinical knowledge.

Patients rightfully expect that teaching hospitals will provide them with the latest in high-quality services. Clinical services are, therefore, frequently organized around an organ system, such as the cardiovascular system, a disease, such as neoplasia, or a therapeutic technique, such as renal dialysis. If the resources needed for clerkships require that junior clerks be assigned to these services, their opportunity for acquiring essential clinical knowledge may be constrained. Even if assignment to specialized units is not necessary, the spectrum of clinical problems in tertiary care teaching hospitals is often confined to extremely ill patients who have complex problems and who require specialized care and the use of advanced diagnostic and therapeutic techniques. Due to the continuing increase in biomedical knowledge and technology, this trend is irreversible. Hospitalization is costly, and there is a trend toward providing care in ambulatory clinics for patients who have relatively simple clinical problems rather than hospitalizing them. This trend is expected to grow.

The working group recommends that faculties assess whether the teaching hospital provides the optimal environment for junior clerkships and, if it does not, consider alternative settings for teaching.

The ambulatory clinic provides an opportunity in which medical students can learn a specific body of essential knowledge. This is often the first opportunity many have to take an initial history and perform a physical examination on someone who has not been examined previously. They have a chance to test their skills in history taking and physical examination. The second distinctive feature of this experience is that students learn to recognize disease in earlier stages. Symptoms and signs of disease are often more subtle in ambulatory patients. Third, there are conditions that are almost always seen only in ambulatory patients. Fourth, some diseases, such as hypertension and diabetes, are managed best in the ambulatory setting, since one has to deal with the issues of adherence to a medication or dietary plan. The effect of patients' independent decisions to take drugs or to follow diets cannot be taught in the inpatient setting. Finally, depending on the length or design of their ambulatory experience, students may learn about continuity of care, because they see chronically ill patients at different times in their illness. Thus, they can learn about the importance of patient education in effective, long-term management of medical problems.

The limiting factor for ambulatory clinic clerkships is time. For patients, interviews and examinations by junior clerks require prolonged clinic visits. For physicians, the time required to supervise and teach junior clerks decreases the number of patients they can see and, correspondingly, decreases their productivity and revenue. Solutions to these problems must be sought, for ambulatory clinic clerkships designed for teaching will become a necessity in the future.

The major problems posed by the nontertiary hospital are that principal medical school faculty members are generally not there and the involvement of such a hospital with graduate medical education may be limited or nonexistent. Developing such a hospital into an effective teaching environment requires the dedication of faculty and resources and a willingness on the part of the hospital's administration and medical staff to accept the responsibilities imposed by education. Solving this challenge can be as difficult as solving the time limitation problem for ambulatory clinical teaching.

Program integration—The division of medical curricula into preclinical and clinical phases has the undesirable effect of artificially separating the basic and clinical sciences. In most schools, clinical faculty members participate in planned clinical correlations, introduced during basic science courses to emphasize the relevance of basic science knowledge. Similar planning for reinforcement of basic science learning during the clinical phase is relatively infrequent. In most schools, basic science faculty members are invited to participate in clinical conferences when their specific area of interest corresponds to a case presentation, but these exercises are not usually directed specifically at medical students. Routine involvement of the basic science faculty on clerkship services is not generally practical. Ideally, an educational program should provide an opportunity for students to study the basic sciences after they have completed their required clerkships.

At the Duke University School of Medicine, the year following the required clerkships is elective, and students are required to select a portion of elective courses in the basic sciences. Until recently, Hahnemann University School of Medicine provided a 24-week sequence of system-based, clinical/basic science correlations after students had completed their required clerkships. Albert Einstein College of Medicine has a required eight-week sequence in the fourth year entitled, "Scientific Basis of Clinical Medicine."

These are examples of how a few schools have incorporated the basic science faculty into the clinical phase.

The general experience is that once students enter the clinical phase and become active participants in patient care, it is difficult to redirect their attention toward strengthening their knowledge of essential scientific concepts through formal exercises. This difficulty probably accounts for the relative rarity of programs such as these, but the reluctance of students to return to basic sciences should not deter faculties from trying to integrate basic and clinical science education.

The working group recommends that formal integration of basic science faculties into the clinical phase be accomplished using approaches best suited to the common interests and talents of basic science and clinical faculty members in each school.

Testing and Evaluation

Medical school faculty members depend too heavily on multiple-choice examinations to evaluate students' knowledge. These examinations are powerful determinants of how students interpret the purpose of their studies. The approaches of medical students to learning not only during medical school but also throughout their professional careers will be affected by this early conditioning.

Medical school faculty members generally profess that their goal is to educate students to be critical thinkers, problem solvers, and lifelong learners, but they rely predominantly upon multiple-choice examinations which evaluate students' abilities to memorize and recall detailed facts. Multiple-choice examinations are widely used because they are easy to grade and provide a numerical score. Although they can effectively evaluate the information students have acquired, they are usually not designed to assess how students approach problems and how they apply knowledge.

The working group recommends that medical school faculties use alternative or supplementary methods that evaluate students' approaches to acquiring and using knowledge instead of relying on multiple-choice examinations. It further recommends that faculty members employ evaluation methods that reinforce study approaches compatible with continued, independent learning.

Developing alternative methods for evaluation will place an added burden on faculties. Assessing students' reasoning and problem-solving abilities requires more time and more personal judgment than faculties now use. Although standardized measures of problem-solving ability can be provided by multiple-choice questions to a limited degree, they cannot be relied upon solely.

Because of the additional time and personal effort that alternatives to standardized, multiple-choice examinations require, they will be difficult to implement. Since the early 1950s, when the National Board of Medical Examiners adopted the standardized, multiple-choice question format, many faculties have become dependent upon the Part I and Part II examinations for the certifying sequence, both for program and student evaluation. For the academic year 1983–84, 98 U.S. medical schools reported that they require students to take Part I and 91 require Part II. Of these, 62 require their students to pass Part I and 48 to pass Part II (12). The National Board of Medical Examiners, founded to improve the standards of examinations for medical licensure, has become a national standard for achievement in medical education. Using a national standard is, in itself, not bad. But, these examinations measure performance only within a very narrow range of abilities.

The working group recommends that faculties review their use of the National Board of Medical Examiners certification sequence as a measure of student performance to determine whether or not both the content of the examinations and faculties' ability to evaluate the acquisition of essential knowledge are commensurate with their schools' educational goals.

Conclusion

There is a widely held belief that students at most medical schools are presently overburdened with memorizing a vast body of information. This demand on their intellectual talents inhibits their development of a sound conceptual scientific framework for medicine and their continued independent learning. Although delineating essential knowledge in both basic and clinical sciences is not easily accomplished, it is the major challenge that faculties must meet. Having achieved this goal, faculties can best ensure that students will develop appropriately their fundamental skills, personal qualities, values, and attitudes during their college preparation and general professional education for medicine.

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Impact of Women and Foreign Medical Graduates On Specialty Distribution of U.S. House Officers

Stephen S. Mick, Ph.D., and Jacqueline Lowe Worobey

Abstract—The increase in the number of women and the decline in the number of foreign medical graduates (both foreign- and U.S.-born graduates of medical schools outside the United States) in U.S. medicine are studied by comparing the specialty distributions of U.S. house officers in the 1973–74 and 1979–80 training years. The joint effect of the distribution of sex and foreign versus U.S. medical graduate status on specialty selection is also examined. The results showed that although male and female house officers who were graduates of U.S. medical schools increased in number over the seven-year period, the rate of increase for females was over 12 times as great as the rate for men. By contrast, although male and female house officers who were graduates of foreign medical schools decreased over the same period, the rate of decrease for males was over nine times as great as the rate for women. U.S.-educated men and foreign-educated men had similar distributions across the specialties, whereas U.S.-educated women and foreign-educated women differed not only from each other but also from both groups of men. The specialty selection of foreign-educated females in the 1979–80 training year was especially different from the other three groups. Implications of these data are discussed in the context of the argument that there is a physician surplus.

During the 1970s, the gains of women and the decline in the numbers of foreign medical graduates (FMGs) were thought to be important in changing the composition of the physician manpower pool of the United States. Attention was directed either to the increasing presence of women (1–3) or to the initially enormous and then decreasing contribution by FMGs to U.S. medicine, especially at the graduate medical education level (4–6). The striking thing about these two topics is that they have not been discussed simultaneously. Aside from an analysis by Goldblatt and Goldblatt (7) in which FMGs as a group were compared with U.S. medical graduate (USMG) men and women, the authors know of no studies which have examined the joint effect, if any, of sex and FMG-USMG status on medical practice. That is, no one has isolated FMG women and compared them with other subgroups of medical graduates.

The research on which this article was based was funded in part by a grant from the Educational Commission for Foreign Medical Graduates. However, the conclusions expressed in this paper are those of the authors and are not necessarily those of the commission.

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The purpose of the authors in this paper was twofold. First was to compare the distributions of U.S. house officers in the 1973–74 and 1979–80 training years by sex and FMG-USMG status to show the growth and change in the house officer pool. FMGs refer to graduates of foreign medical schools whether they were foreign or U.S. citizens, and USMGs refer to graduates of U.S. medical schools regardless of their citizenship. Although it would have been desirable to have assessed the foreign national FMGs separately from the U.S. citizen FMGs, there were no data known to the authors to permit such an analysis. The 1973–74 training year was chosen because it represented the zenith of FMG inflow into the United States. The 1979–80 training year was selected because it was the most recent year for which published data were available permitting the disaggregation of house officer statistics by sex and FMG-USMG status. The authors' second purpose was to examine the joint effect of these two variables on patterns of specialization.

The decline of FMGs in the United States was brought on in part by the enactment of the Health Professions Educational Assistance Act of 1976 (P.L. 94-484), which made it more difficult for foreigners to stay in the United States by switching from the popular exchange visitor visa to the permanent resident visa. Passing the Visa Qualifying Examination as a prerequisite for obtaining the exchange visitor visa also added to the decline. And, the increasing enrollment and graduation of men and women at U.S. medical schools produced a competitive pressure against the immigration of FMGs (4, 6, 8). FMGs declined over the seven-year period 1973–74 to 1979–80 from 17,220 to 12,065 house officers, an absolute decrease of 5,155 and a relative decrease of 29.9 percent. USMG house officers, by contrast, grew by 11,422, a relative increase of 27.8 percent. Overall, the entire house officer pool grew by 10.7 percent, an increase of 6,267.

This large absolute and relative increase in house officers in a comparatively short time has been the subject of both praise and concern. Those supporting opportunities for medical education regardless of sex praised the fact that of the 6,267 increase in the number of house officers, 5,766 (92.0 percent) were women (2). This is a rather extraordinary number. The absolute numbers of men during the two periods remained relatively constant, registering a mere 1.0 percent increase, while the number of women increased by 86.5 percent. Clearly, the gain in women in the profession of medicine during the 1970s was a phenomenon and reflected efforts by U.S. medical schools to open the field to qualified persons regardless of sex.

On the other hand, concern was expressed by the federal government and some medical educators that a physician surplus was upon us and would remain until the 21st century (9). Thus, the growth of 10.7 percent in the house officer pool in just a seven-year period troubled those foreseeing a physician surplus. However, countertrends are already evident: decreases in medical school admissions leading ultimately to decreases in the number of graduates of U.S. medical schools and the leveling off of house officer positions (10). In regard to the latter, in the two training years beginning in 1982–83, there were finally more applicants for house officer positions than there were slots available (11).

It is obvious that, at least in the 1970s, USMGs, not FMGs, accounted for the increase in the overall number of house officers. While USMGs grew by 27.8 percent, FMGs declined by 29.9 percent. However, these figures obscure less visible trends that make it important to look at the joint distribution of sex and FMG-USMG status and its change over time. USMG men contributed much less to the overall growth of the house officer pool than did USMG women. While the number of USMG men increased by 14.6 percent, the number of USMG women grew by a phenomenal 178.2 percent. And while FMGs as a class declined over the seven-year period, it was almost exclusively concentrated among the FMG men and not the FMG women, the former group declining by 36.3 percent and the latter by only 3.8 percent. It has not been well known or acknowledged in the literature that FMG women, while a small component of the total house officer pool, have nevertheless been a constant component of the pool (5.8 percent in 1973–74 and 5.0 percent in 1979–80). Yet, this small subgroup of house officers may have an impact disproportionate to its size in rendering medical services in the nation.

Specialty Training

As shown in tables 1 and 2, the authors have disaggregated USMGs and FMGs by sex and specialty areas, based on information published by the American Medical Association (12, 13). For comparative purposes, the specialties have been grouped according to primary care, hospital-based, secondary and tertiary specialties of internal medicine, secondary and tertiary specialties of surgery, and psychiatry and physiatry (including physical medicine and rehabilitation). Primary care included family practice, general practice, internal medicine, obstetrics/gynecology, and pediatrics. Hospital-based specialties included anesthesiology, diagnostic and therapeutic radiology, forensic pathology, and pathology. The psychiatric/physiatry grouping was made not because of any substantive kinship but because the specialties had unusually large proportions of FMGs and would have been obscured if they had been included among the medical specialties. Data on only those house officers who were residents (that is, who were not interns) are presented in Table 1, because information on the specialties to be chosen by the interns was not available. Thus, the analysis excluded all 9,569 interns in the 1973–74 training year. Data on house officers in the 1979–80 (Table 2) training year included all individuals in training because the term "intern" had generally been dropped and because specialties were determined in the first year of graduate medical education. This difference in the two data sources does not create artifactual results because the authors do not look at absolute or relative change over time. Rather, within each of the four subgroups, the number and percent in each specialty grouping are calculated. The relative frequencies of the specialties across each of the subgroups are then compared to determine the distribution of USMG men, USMG women, FMG men, and FMG women. These steps are taken for each of the two training years.

In the 1973–74 training year, female USMGs were noticeably more likely than any of the other three groups to be found in primary care specialties, a finding supported by many other reports (1, 7, 14). In these same specialties, female FMGs were actually underrepresented compared with the proportion of all medical graduates in this specialty area. In the hospital-based specialties, it was the FMG women who had an overwhelmingly large presence relative to their numbers: 36.8 percent versus an average of all groups of 17.3 percent. USMG women were only

TABLE 1

Distribution of House Officers and Specialty Areas by Status as U.S. Medical Graduates (USMG) or Foreign Medical Graduates (FMG) and by Sex, 1973–74 Training Year*

Specialty Area	USMG				FMG				Total	
	Male		Female		Male		Female			
	No.	Percent†	No.	Percent	No.	Percent	No.	Percent	No.	Percent
Primary care	11,929	38.0	1,223	48.3	4,799	39.1	915	35.1	18,866	38.7
Hospital-based	4,551	14.5	423	16.7	2,512	20.5	961	36.8	8,447	17.3
Medical specialties	1,396	4.5	118	4.7	335	2.7	80	3.1	1,929	4.0
Surgical specialties	10,434	33.3	239	9.4	3,491	28.5	102	3.9	14,266	29.2
Psychiatry, physiatry	3,060	9.8	529	20.9	1,130	9.2	552	21.1	5,271	10.8
Total	31,370	100.1	2,532	100.0	12,267	100.0	2,610	100.0	48,779	100.0

* Data exclude all house officers classified as interns.

† Percentages do not equal 100 percent due to rounding.

TABLE 2

Distribution of House Officers and Specialty Areas by Status as U.S. Medical Graduates (USMG) or Foreign Medical Graduates (FMG) and by Sex, 1979–80 Training Year

Specialty Area	USMG				FMG				Total	
	Male		Female		Male		Female			
	No.	Percent	No.	Percent	No.	Percent*	No.	Percent*	No.	Percent*
Primary care	21,758	50.2	5,890	64.0	3,831	43.3	1,552	48.1	33,031	51.1
Hospital-based	5,335	12.3	1,071	11.6	1,376	15.6	771	23.9	8,553	13.2
Medical specialties	2,069	4.8	366	4.0	322	3.6	102	3.2	2,859	4.4
Surgical specialties	11,673	26.9	945	10.3	2,527	28.6	115	3.6	15,260	23.6
Psychiatry, physiatry	2,511	5.8	932	10.1	782	8.8	687	21.3	4,912	7.6
Total	43,346	100.0	9,204	100.0	8,838	99.9	3,227	100.1	64,615	99.9

* Percentages do not equal 100 percent due to rounding.

slightly more likely to be found in these specialties than were USMG men. Moreover, FMG men were more like both of their USMG counterparts than they were like the FMG women.

Although there was little variation among the four groups in the medical subspecialties, great differentiation was present for the surgical area. One-third of USMG men were in surgery and its subspecialties. The proportion of FMG men was almost as high, 28.5 percent. Only 9.4 percent of USMG women were training in these specialties in 1973–74, and an even smaller percentage of FMG women (3.9 percent) was found in them. Surgery was a male-dominated domain regardless of U.S. or foreign medical education.

Finally, the opposite situation prevailed for psychiatric specialties and physiatry. Both female USMGs and FMGs were about equally represented in this category, and both male USMGs and FMGs were less than one-half as likely as the women to be located in this area. Psychiatry and physiatry were the choices of one out of five women and less than one out of 10 men, regardless of location of medical education.

The picture six years later was similar in some aspects and different in others. While the total proportion of house officers in primary care specialties rose from 38.7 percent to 51.1 percent, the disproportionate presence of USMG women, based on their total number, in the primary care specialties was stronger than ever. The presence of FMG women in hospital-based specialties was once again out of proportion to their number, and the proportions of FMG men, USMG men, and USMG women in these specialties were much alike. Roughly similar distributions of all four groups in the medical subspecialties prevailed as it had six years earlier. Men, both FMGs and USMGs, were much more likely to be in surgical training; more FMG men proportionately were in surgical training than USMG men. The USMG female group made no more than a small percentage gain in surgery, and FMG females actually lost ground. Finally, in psychiatry and physiatry the FMG women were still overrepresented compared with the proportion of all medical graduates in these specialties, while the number of USMG women declined by over 10 percentage points from the 1973–74 level.

From the early to the late 1970s, despite shifting marginal distributions of all house officers toward primary care and away from hospital-based, surgical, and psychiatric specialties, major patterns of differentiation according to subgroup were maintained and, indeed, heightened. USMG males predominated in surgical specialties. The proportion of USMG females in primary care specialties increased, while the proportion in psychiatry and physiatry declined. The proportionate distribution of FMG males in each specialty area was about equal to that of USMG males. FMG women were found in disproportionate numbers in hospital-based specialties and psychiatry and physiatry. They were noticeably underrepresented at both time periods in surgical positions.

Comment

The image of the FMG moving into specialties eschewed by USMGs may need revision. Based on the results of the study reported here, it appears that the FMG female house officers are the most likely of the four groups to be found in the so-called "traditional" FMG residencies, for example, pathology, therapeutic radiology, psychiatry, and physiatry (15). The distribution of FMG males is much more like that of USMG males, or even USMG females, than FMG females. Moreover, between the two female groups, except for a shared underrepresentation in surgical specialties in which USMG women in 1979–80 were nevertheless still about 2.9 times more likely to be found than FMG women, little similarity emerged.

This internal differentiation among house officers by sex and FMG-USMG status must be placed in the context of the overall decline in the numbers of FMGs in the United States. During the period of the present study, FMG men experienced a decline of 36.3 percent, a loss of some 5,026 individuals, while FMG women had a much smaller decline, 3.8 percent, a loss of 127 individuals. Whatever the forces that produced the decline in male FMG house officers, they have not affected the number of FMG women as much. Because of the differences in specialty distribution, it can be hypothesized that FMG women have not encountered the same competition for residency positions experienced by the FMG men. This places the FMG female house officer in a critical role. Goldblatt and Goldblatt (7) projected that, as the numbers of FMGs declined, USMG women would find themselves either selecting or encouraged to select "less prestigious" specialties. The data in the present study support the Goldblatts' contention that USMG women would enter primary care specialties, some of which rank low in various specialty prestige scales (16, 17). Additionally, using a procedure performed elsewhere on FMGs as a group (5), the present authors determined that the proportions of female USMG house officers in the 20 largest specialties are negatively associated with the physician supply/requirement ratios projected by the Graduate Medical Education National Advisory Committee (GMENAC) for 1990 for each of these specialties ($r = -.418$, $p < .10$) (9). That is, in specialties that will tend toward "shortage" or "near-balance" ratios in 1990, disproportionate numbers of female USMG house officers were found in 1979–80.

Still, it is the female FMG who has experienced even more service in the specialties avoided by the other groups, including USMG women. The correlation between the proportion of FMG women in the 20 largest specialties and the GMENAC supply/requirement ratio is stronger: $r = -.609$ ($p < .01$). The analogous correlation for FMG men is nonexistent, $r = -.094$ ($p > .50$).

In sum, although there are specialty differences between FMGs and USMGs, they are not as strong as those revealed when sex and the FMG-USMG distinction are examined concurrently. These analyses will need to be performed on more recent data to determine whether the differences persist. However, as the authors have already determined, the correlation in the 1982–83 training year for the 20 largest specialties between FMG proportions and the GMENAC 1990 supply/requirement ratios is $-.490$ ($p < .05$) (5), and it seems likely that the sex differences are still present. During the 1970s, women FMGs played a unique role among the specialties. Specific attention should be drawn to this fact as health analysts and medical educators debate the implications of policies and formulate new policies affecting the growth of the physician complement in the nation.

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COMMUNICATIONS

Assessment of Clinical Skills in U.S. Medical Schools

Lawrence J. Fabrey, Ph.D., Susan M. Case, Ph.D., and Barbara J. Andrew, Ph.D.

Medical students typically are not examined systematically on their ability to perform all the clinical procedures which may be expected of them upon entry to a residency program. There is little doubt that the primary evaluation tools in medical school are cognitive examinations and rating scales, neither of which evaluates the performance of specific clinical skills in detail. The instrument that is most likely to provide a valid and reliable indication of competence to perform a specific procedure is a checklist. Checklists provide a detailed list of the components of a procedure and are used while observing the performance of the procedure. Typically, the observer records whether or not each component was performed in the manner prescribed, but some checklists also call for a judgment about the quality of the performance of a component.

Andrew (1) described the development of behavioral checklists that could be used to assess a physician's assistant's ability to perform components of a physical examination. McSwain and colleagues (2) evaluated whether a simple criterion performance checklist could help students improve their self-teaching of the principles of basic cardiac life support. Liu and colleagues (3) described research using two checklists developed by the Interhospital Study Group. Other studies, such as those of Morgan (4) and Wigton (5), have emphasized the need for training in clinical skills but have not directly discussed their measurement.

Method

The purpose of the study reported here was to identify clinical procedures for which department chairmen felt observational checklists would be useful. A secondary purpose was to investigate aspects of the current use of direct observation techniques for the assessment of clinical skills.

In 1981 the authors mailed a one-page questionnaire to 815 randomly selected chairmen of clinical departments in U.S. medical schools. All respondents were asked to complete all three sections of the questionnaire. The first of the three sections asked whether or not their department uses checklists with direct observation of medical students. The second section included a list of 40 clinical procedures identified through a review of curriculum guides and interviews with residents and clinical faculty members. For each procedure, the respondents were asked to indicate whether or not their department already had a standard form, such as a checklist, or could use such a form if it were available. The third section asked about the purposes for which checklists might be used in their department. The survey was designed in a checklist format, although space for comments was included on the form.

Approximately 10 weeks after the mailing, 319 of the chairmen returned the survey. That number represented a response rate of 39 percent. Responses were received from a total of 102 different medical schools, and the distribution of specialties responding appeared to be representative of the entire sample.

Results

Responding to the first of the three sections of the survey, 20 percent reported that checklists

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The study reported here was partially supported by grant 80-24 from the Commonwealth Fund.

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TABLE 1

Percentage of Clinical Department Chairmen at 102 U.S. Medical Schools Reporting That Checklists Would Be Useful To Evaluate Clinical Skills of Students, 1981

Procedure	Internal Medicine (*n* = 62)	Surgery (*n* = 59)	Pediatrics (*n* = 33)	Obstetrics/ Gynecology (*n* = 23)	Total Group (*n* = 319)
Lumbar puncture	51.6*	16.9	51.5	4.3	32.3
Insert IV	38.7	28.8	27.3	17.4	27.3
Urinary bladder catheter	37.1	32.2	24.2	26.1	27.0
Nasogastric intubation	41.9	35.6	27.3	4.3	26.3
Cardiopulmonary resuscitation	50.0	25.4	30.3	8.7	26.0
Arterial puncture	37.1	25.4	33.3	4.3	26.0
Central venous pressure catheter	33.9	35.6	9.1	21.7	25.7
Endotracheal intubation	41.9	35.6	9.1	4.3	24.5
Gram stain	50.0	11.9	33.3	17.4	24.5
Venipuncture	35.5	25.4	30.3	17.4	23.5
Dressing wound	24.2	52.5	3.0	13.0	21.9
Pleural cavity aspiration	50.0	32.2	18.2	8.7	21.9
Intravenous injection	35.5	16.9	30.3	4.3	21.3
Urinalysis	37.1	15.3	24.2	8.7	21.0
Cleanse, debride, suture	25.8	42.4	6.1	4.3	21.0

* Interpretation of this cell entry is as follows: Of the 62 respondents representing internal medicine, 51.6 percent indicated that they could use a form such as a checklist to evaluate student performance of a lumbar puncture.

were currently used in their departments. The survey showed that observations of medical students were usually made by attending physicians (90 percent), residents (60 percent), and to a lesser extent by nonphysician personnel (27 percent).

Table 1 summarizes the second section of the survey, showing 15 procedures for which at least 20 percent of the 319 faculty respondents reported that checklists would be useful in four disciplines. There was some difference among the four specialties in the ranking of procedures for which checklists were considered to be most useful. At least half of the internal medicine respondents selected lumbar puncture, cardiopulmonary resuscitation, Gram stain, and pleural cavity aspiration. On the other hand, the most useful procedures to surgery respondents were changing the dressing on a wound (53 percent) and cleansing, debriding, and suturing a simple laceration (42 percent). Pediatrics department chairmen most frequently selected lumbar puncture (52 percent), while obstetrics and gynecology respondents most frequently chose urinary bladder catheterization (26 percent).

In response to the third section of the survey, 53 percent of the chairmen indicated that they would use checklists to teach the steps of a procedure, and 55 percent indicated that checklists would be used to provide feedback to students regarding their performance. Forty-three percent of the respondents would use them to evaluate formally student performance of a procedure, but only 24 percent would recommend that performance, as measured by such checklists, be a requirement for successful completion of a clerkship. Only 15 percent of the chairmen reported that they would not use checklists, about half of these because of a lack of relevance of the 40 clinical procedures to their particular specialty.

Discussion

Clear interest in the use of observational checklists was expressed by the respondents, although few had checklists available for use. More than half of the respondents indicated that they would use such checklists for teaching the steps of a procedure or for providing feedback to students regarding performance. Checklists for any of the 40 procedures listed on the survey would probably be less appropriate for certain departments (for example, psychiatry, ophthalmology, or dermatology) than for others (for example, internal medicine, surgery, or family practice).

It was not surprising that there was not agreement across departments regarding procedures for which it would be most useful to have a checklist. Within a specialty, however, certain procedures were selected by 50 percent or more of the respondents. This indicated a considerable interest in checklists for procedures unique to a particular specialty. In addition, for some of the more frequently selected procedures, at least some of the respondents in all specialties would be interested in using a checklist.

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Formal Resuscitation Training in Medical School

K. A. Handal, M.D., and Jerome Greenberg

In 1973 the report (1) on the Conference on Education of the Physician in Emergency Medical Care, sponsored by the Council on Medical Education of the American Medical Association, stated that "competence in emergency medical care should be considered on par with competency in any other area of medicine as a requirement for graduation" and that "certain knowledge and manipulative skills are requisites for the delivery of emergency medical care, and must be included in the curriculum of all medical students."

It has been almost 25 years since Kouvenhoven and colleagues (2) introduced external chest compression and almost 10 years since the National Academy of Sciences-National Research Council (NAS-NRC) conference on cardiopulmonary resuscitation (CPR) recommended the training of medical personnel in external cardiac compression techniques according to standards of the American Heart Association (AHA) (3).

A standardized body of information that reflected the state of the art in basic life support (BLS) and advanced cardiac life support (ACLS) was developed in 1975 into conceptual materials by the AHA and updated in 1981 (4). Development by the AHA of stand-

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A Delphi Study To Identify Future Roles for Physician's Assistants

Steven R. Shelton, Barbara Ann Lyons,
Ruth M. Allen, Ph.D., and Dan C. Allensworth, M.D.

Those responsible for reviewing and accrediting physician's assistant (PA) programs believe that the goal of PA training is to place graduates into primary care service areas (1). In fact, virtually all the early graduates of PA programs entered primary care practices (2, 3).

Despite reports of a stable level of PAs practicing in primary care, in recent years different roles for PAs have developed (4). Thus, a need for identifying future professional roles for PAs was seen by the authors, and a four-round Delphi study of PA program faculties was carried out in 1982. The Delphi technique has been used in medicine and the health sciences as a means of achieving a consensus among respondents (5–8). The approach ensures anonymity of the respondents in order to provide an unbiased framework for the purpose of identifying possible roles, supplies feedback to the respondents so that they have data upon which to base subsequent decisions, and permits statistical analysis to be conducted so that the results can be useful in planning.

The Delphi study reported here was well received by the respondents and demonstrated active participation on their part. The continued cooperation of the participants in each round supports the use of the method as a valid procedure for arriving at specific conclusions.

Questionnaires were initially mailed to 50 PA programs. After responses to the fourth and last round of mailings, usable surveys totaled 39.

Problems encountered in the study included the identification of a higher-than-expected number of roles and the mixed selection of categories used in the subsequent rounds, which combined practice type and practice settings.

The analysis of responses revealed a prevailing attitude among PA educators that most PAs would continue to work in primary care practices but that diversification in practice location would occur (Table 1). A trend to-

TABLE 1

Ranking of Likelihood of Future Roles for Physician's Assistants (PA) Identified Through a Delphi Study of 39 PA Programs, 1982

Role	Mean*
Primary care PA	6.67
Surgical PA/surgeon's assistant	4.48
Health maintenance organization	4.33
House staff PA	3.81
Emergency medicine PA	3.80
Industrial/occupational health PA	3.24
Armed forces PA	2.91
Hospital PA	2.87
Physical assessment/health screening PA	2.56
Private practice PA	2.56
Specialty care PA	2.52
Rural/inner city PA	2.50
Geriatrics PA	2.48
Cardiovascular-thoracic PA/surgeon's assistant	1.98
Extended care/nursing home PA	1.93
Prison PA	1.63
Patient educator	1.17
Mental health institution PA	1.13
PA program instructor	1.09
Preventive medicine PA	.97
Health educator	.56
Office-clinic manager	.37
School health PA	.19

* Means calculated from rank-order assignment for each role. Scale ranged from 1 to 10, with 10 being "most likely."

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ward employment in various institutional settings with a variety of patients is expected, including Veterans Administration hospitals, private hospitals, nursing homes, health maintenance organizations (HMOs), mental health facilities, and correctional institutions. This trend has also been reported by Cawley and colleagues (9). The impact of the diagnosis-related group reimbursement system on this trend has not yet been felt fully; however, an increase in awareness of costs by institutions may be focusing more attention on the cost efficiency of employment of PAs. A decrease in the number of residency positions, coupled with a decrease in the funding of staff positions, may be resulting in the hiring of more PAs as substitutes for persons who would have been in those positions. Differences in the perception of malpractice risk by health care administrators further affect the employment of PAs by institutions.

The increase in institutional utilization of PAs raises several questions. First, have PAs been included formally in the long-range plans of the major proprietary health services providers, HMOs, and others? Second, has enough research been done to describe and demonstrate the efficiency and utilization patterns of PAs? Third, what role do institutional employers play in the efforts of the PA profession to establish reimbursement procedures within Medicare and Medicaid? Reimbursement for PA-provided services is one of the last obstacles the profession must surmount in order to receive maximum benefits for the care they provide to patients.

The results of the survey described here leave little doubt that clinical roles in primary care should continue to be the focus of PA program curricula. Nonclinical roles for PAs will continue to develop in the future but will not play a significant part in PA education. In other words, physician's assistants who are taught the fundamentals of data collection, including history-taking and physical assessment, along with problem-solving skills, will be able to function effectively in numerous situations. Some programs may require clinical curriculum revisions that address the changes associated with practice location. Specialized clinical roles that reflect new trends in health care, such as increased interest in geriatrics, may also require additional attention in the curriculum. Highly technical roles for PAs in specialty practices will continue to necessitate on-the-job training or postgraduate programs.

The reporting by the survey respondents of a large and diverse group of career alternatives supports the notion that a degree leading into the PA profession provides qualifications that, along with other educational credentials and various work and life experiences, makes graduates of PA programs eligible for a wide range of occupational roles in clinical and nonclinical positions.

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DATAGRAM

Financial Assistance for Medical Students, 1983–84

Each year the Association of American Medical Colleges (AAMC) collects data through the Liaison Committee on Medical Education (LCME) annual questionnaire from its member medical schools on financial assistance awarded to medical students. The following summary is the second in an annual series to be published in this journal.

Table 1 shows the financial assistance awarded to medical students from all sources

TABLE 1

Sources of Medical Student Financial Assistance

Sources	1982–83			1983–84		
	Total Amount (in millions)	Number	Average Amount	Total Amount (In millions)	Number	Average Amount
Scholarships						
Administered by schools						
Exceptional financial need	$ 2.4	172	$14,238	$2.5	173	$14,334
Medical Scientist Training Program	7.9	662	11,950	7.2	525	13,719
School funds	30.8	13,297	2,313	30.0	12,741	2,426
Other scholarships	9.1	6,283	1,460	10.7	6,463	1,654
Subtotal	50.2			50.4		
Not administered by schools						
Armed Forces health professions	48.8	3,171	15,402	51.2	3,289	15,575
National Health Service Corps	23.5	1,556	15,086	9.1	661	13,691
National medical fellowships	0.7	730	935	1.2	811	1,528
Other (with service commitment)	9.7	1,824	5,329	9.5	1,823	5,206
Subtotal	82.7			71.0		
Total scholarships	132.9			121.4		
Loans						
Administered by schools						
Health professions student loans	22.9	9,551	2,403	22.0	8,925	2,459
Guaranteed student loans	4.7	984	4,786	7.2	1,471	4,840
National direct student loans	14.9	8,057	1,851	18.2	8,729	2,087
Loans from school funds	16.8	7,495	2,244	22.7	8,939	2,540
Subtotal	59.3			70.1		
Not administered by schools						
Guaranteed student loans	178.5	37,624	4,745	188.6	39,052	4,829
Health education assistance loans	50.4	6,554	7,695	78.8	9,830	8,013
Parental loans for undergraduate students	11.3	3,930	2,864	18.0	6,245	2,884
Other loans	6.0	2,476	2,418	6.2	2,614	2,370
Subtotal	246.2			291.6		
Total loans	305.5			361.7		
College Work Study Program	1.4	1,092	1,284	2.7	1,768	1,521
Grand total	439.8			485.8		

known to the 120 schools reporting in academic year 1983–84 and the 118 schools reporting in 1982–83. A decrease of $25.4 million, a 5.5 percent drop, in total student assistance awarded in 1982–83 from the previous year was more than compensated by a $46.0 million, or 10.5 percent, increase in 1983–84 (Table 2). Thus, the total amount of student assistance awarded in 1983–84 was greater than the total for either 1981–82 or 1982–83.

A trend away from scholarships and toward loans was reestablished in 1983–84. Total scholarships declined $11.5 million, or 8.7 percent, while total loans climbed $56.2 million, or 18.4 percent. Simultaneously the first-year cost of attending medical school rose 11.1 percent at public schools and 7.1 percent at private schools. This compares with an increment of 10.4 percent at public schools and 14.4 percent at private schools in the previous year.

The major increase in student financial assistance was in loans not administered by schools, which emanate principally from banks or states stimulated by a federal guarantee. The largest increase occurred in the Health Education Assistance Loan (HEAL) Program, in which the increase was $28.4 million, or 56.3 percent, compared with an increase of $17.2 million, or 51.8 percent, in 1982–83 over the previous year. The second largest increase in 1983–84 was $10.1 million in the Guaranteed Student Loan (GSL) Program. The third overall largest increase of $5.9 million was in loans from school funds, a 35.1 percent rise over the previous year, which had had an increment of $7.2 million, or 74.8 percent, over 1981–82.

TABLE 2

Changes in Financial Aid to Medical Students, 1974-75—1983-84 (Dollars in millions)

Academic Year	Total Assistance	Increase/Decrease from Previous Year	
		Amount	Percent
1983–84	$485.8	$+46.0	+10.5
1982–83	439.8	−25.4	− 5.5
1981–82	465.4	+63.5	+15.8
1980–81	401.9	+63.9	+18.9
1979–80	338.0	+73.9	+28.0
1978–79	264.1	+57.7	+28.0
1977–78	206.4	+41.1	+24.9
1976–77	165.3	+16.5	+11.1
1975–76	148.8	+29.4	+24.7
1974–75	119.3	+29.9	+33.5

Declines in student assistance were led by the $14.4 million drop in the National Health Service Corps (NHSC) Scholarship Program, which was phased down to assist only approximately 140 new students in 1983–84. There was also a small decline of about $200,000 in the category of "other" scholarships with a service commitment. Although these declines may signal a move away from service committed aid not only by the federal government but also by the states and other agencies, there was a modest $2.4 million increase in the Armed Forces Health Professions Scholarship Program.

Table 3 itemizes the medical student financial assistance awarded from federal programs in 1983–84 and 1982–83. The 10.6 percent growth in federal dollars disbursed was virtually identical to the 10.5 percent overall growth rate in student aid between 1982–83 and 1983–84. Therefore, it was the federal programs which accounted for the increase in aid funds, while the amount of total awards from private and state sources remained almost unchanged. The federal programs also were largely responsible for the previously mentioned downward trend in scholarship awards and upward swing in loan awards. The large increment in Health Education Assistance Loan Program is important because the program's relatively high interest rate and an insurance premium charged to borrowers make it the most costly to repay. It, therefore, is a major contributor to the growth in student indebtedness.

Like the federal programs, the schools provided an overall, although relatively modest, increase in funding between 1981–82 and 1982–83. School funds for scholarships, also like the federal programs, declined by about $800,000, but a $5.9 million increase in school loan funds produced an overall gain of $5.1 million, or 10.7 percent rise, in total school funds. In addition, guaranteed student loans made by schools were $2.5 million, or 53.2 percent, higher in 1983–84. Both of these increments indicate the continuing commitment

TABLE 3

Medical Student Financial Assistance from Federal Programs

(Dollars in millions)

	1982–83 Amount	1983–84 Amount	Amount Change	Percent Change
Scholarships				
Exceptional financial need	$ 2.4	$ 2.5	$+ 0.1	+ 4.2
Medical Scientist Training Program	7.9	7.2	− 0.7	− 8.9
Armed Forces health professions	48.8	51.2	+ 2.4	+ 4.9
National Health Service Corps	23.5	9.1	−14.4	−61.3
Total scholarships	82.6	70.0	−12.6	−15.3
Loans				
Health professions student loans	22.9	22.0	− 0.9	− 3.9
Guaranteed student loans	183.2	195.8	+12.6	+ 6.9
National direct student loans	14.9	18.2	+ 3.3	+22.1
Health education assistance loans	50.4	78.8	+28.4	+56.3
Parental loans for undergraduate students	11.3	18.0	+ 6.7	+59.3
Total loans	282.7	332.8	+50.1	+17.7
College Work Study Program	1.4	2.7	+ 1.3	+92.9
Grand total	366.7	405.5	+38.8	+10.6

of the schools to assist their students to fund their educational programs.

In 1983–84, 68.8 percent of the medical students received financial aid compared with 67.0 percent the previous year. The number of students who applied for need-based aid rose 3,519, or 12.0 percent, from 29,239 to 32,758; and the amount of financial need determined by the schools for those students was $355.9 million compared with $293.0 million the previous year, an increase of 21.5 percent. The portion of the calculated need that was not funded by any source of financial assistance was $32.9 million, up $5.5 million, or 20.1 percent, from the previous year.

The mean educational debts of senior students reported on the questionnaire rose 12.4 percent from $23,914 to $26,883, compared with an 18.9 percent growth in 1982–83 from $20,116 in 1981–82. These figures are supported by data provided on the annual AAMC graduation questionnaire by seniors graduating in 1984, which indicated that debts for indebted seniors went up 11.9 percent from $23,674 to $26,496. The number of students reported to have educational debts of $30,000 or more on the LCME annual questionnaire increased 49.9 percent from 2,172 to 3,255, or 35.5 percent of the graduating class members who reported debt.

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Health Care Delivery System Changes: A Special Challenge for Teaching Hospitals

C. Thomas Smith

Abstract—Changes in the method of financing health care in the United States in order to gain better control over escalating costs are receiving considerable attention. If major changes are made in the system, the nation's teaching hospitals are particularly vulnerable and must be given special consideration. The attributes of teaching hospitals and the special role which they play in the health care delivery system are delineated. Since responsiveness to system changes by teaching hospitals is key to their survival, several short-term and long-term strategies are identified. Teaching hospitals will need to be as innovative in their management and organizational approaches as they are clinically.

For over a quarter of a century, from the early 1950s to the late 1970s, American hospitals experienced enormous growth and enjoyed the opportunity and privilege of almost unlimited access to resources in developing new and expanded services for their communities. However, the combination of an industry which consumes more than 10 percent of the gross national product (GNP) and an economy which forces governments at all levels and businesses to scrutinize all expenditures has resulted in a public clamor for changes in health care delivery that may be unprecedented.

A review of the major forces which created this circumstance shows that many of the goals established for health care over the years were achieved. However, due to a slower growing economy and to competition for government support for other programs, the successes of the health care delivery programs are now exacting too high a price. The natural reaction is to assign blame, to call carelessly for change, and to want all of the same services for less cost. All participants in health care delivery must be careful to assess the factors which created the current environment and to avoid tossing aside ingredients which are essential to continued achievement of society's health service goals. Similarly, it is important to understand that while certain efficiencies may be achieved, it is unlikely that any new arrangements will allow doing everything with less resources.

Federal Policy Role

There were several major public policy initiatives which helped create the successes and problems regarding health care delivery. Starr (1) carefully documented the variety of federal programs which were developed over the past three decades for socially desirable purposes. All

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were aimed at increasing the nation's knowledge in medicine and assuring that everyone had access to health care services. As a result, federal policies created the current environment.

In the 1950s the federal government began a massive investment in biomedical research via the National Institutes of Health, a commitment which has yielded impressive dividends. Federal policy was also promulgated to assure local access to health service by building hospitals throughout the country with construction financing provided through the federal Hill-Burton program. With more hospitals providing more services to more people, health insurance coverage was expanded by employers as standard fringe benefits.

The 1960s witnessed some payback from the research investment. New technology began to foster development of new health care services. A desire to assure the broadest possible dissemination of the new knowledge and technology regarding medicine led to the federally financed regional medical program, which assisted hospitals in gaining access to the latest technology. Additional service capacity generated needs for more health manpower to deliver these services, and again the federal government financed more and larger schools for producing physicians, nurses, and other health professionals. The growing health care system also highlighted the inability of the elderly and poor to secure services on an equal footing with other segments of society, and so Medicare and Medicaid were created by Congress to improve access to health services for this portion of the population.

In the 1970s emphasis was placed on enhancing the health care system's performance, with key objectives being accessibility, continuity, and comprehensiveness. "Health care as a right" became a rallying cry of many of those demanding access to services for all citizens. Governments accepted an obligation to deliver on this proclaimed "right" and thus became increasingly involved not only in financing but also in planning health services. Public efforts to control the health system included approval of capital expenditures and major program changes by federally created comprehensive health planning agencies.

In summary, the federal government sponsored expansion of medical knowledge, technology, institutions, services, manpower, and finances and assumed responsibility for assuring accessibility to all segments of society. Thus, it is not surprising that the share of the GNP consumed by health services has tripled in the last half century. Public policy initiatives created programs and provided the financing which produced this outcome. Hospitals and medical schools were developed to provide access to the latest health care technology and to prepare future health manpower. There seems to be general agreement by both critical observers and the public that superior quality health services are available in this country. In fact, so many benefits were derived from research and technological development that there is now broad concern about problems created by the extension of life.

Contributing to this scenario has been the nation's system of financing health care delivery. The nonprofit hospitals have functioned as quasi-tax authorities with income redistribution capacity. For example, the perennial underfunding of government-sponsored patients, even after Medicare and Medicaid payments, has forced hospitals to levy a "tax" on nongovernment patients to make up for the government's reimbursement "short-fall." Similarly, the traditional method of funding medical and nursing training has been to add the cost of these educational programs to the cost of care for patients in those hospitals with education as part of their mission.

The federal government's changes in the method of paying for Medicare hospital services are anticipated to have a profound effect upon the ability of nonprofit hospitals to continue these income redistribution practices. Especially vulnerable are those large urban hospitals which serve low-income populations and which operate significant teaching programs. An examination of this group of important institutions is instructive in understanding the dilemma society faces in balancing the need to restrain cost growth with the imperatives of equitable access for all citizens and training of health care manpower.

Teaching Hospital Characteristics

While many hospitals are teaching hospitals, the discussion here will focus on the members of the Association of American Medical Colleges (AAMC) Council of Teaching Hospitals (COTH), since data are readily available for this group. COTH members offer substantial postgraduate physician training programs in the major disciplines and are affiliated with a medical school. Selected statistics (Table 1) reveal the following important facts:

1. Since COTH members are generally larger than most hospitals, they represent only 5.5 percent of the nation's hospitals but 18.7 percent of the beds.

2. COTH hospitals generally have patients who are sicker and have more complex requirements; therefore, these hospitals' admissions (17.5 percent of the nation's patients) account for 20.1 percent of the total patient days.

3. Large outpatient programs are operated at teaching hospitals, accounting for nearly one-third of all hospital-based clinic visits.

4. Although COTH hospitals admit less than one-fifth of hospitalized patients, they train nearly three-fourths of all residents.

5. Because of the complexity of care they provide and their large clinics, COTH members receive over one-fourth of all revenue while accounting for one-fifth of the patient days.

6. The locations and types of patients served result in COTH hospitals carrying more than a third of all bad debts and providing nearly one-half of all hospital charity care.

The AAMC Department of Teaching Hospitals has identified a number of common characteristics of teaching hospitals that make it reasonable to generalize about them (2). A profound influence on these institutions is their commitment to multiple institutional objectives. The operation of these institutions would be far simpler if they would limit their goals. Clearly, having fewer goals is a distinct advantage of the investor-owned hospitals. However, teaching hospitals typically proclaim, to varying degrees, their commitment (*a*) to provide a complete range of high quality services, (*b*) to operate approved educational programs for physicians and other health professionals, (*c*) to provide a setting for the conduct of medical research, and (*d*) to offer a host of community service activities to enhance the quality of life in their community.

Although all hospitals are complex organizations, teaching hospitals have more special interest groups which believe they each deserve some measure of control over certain aspects of the operation. This fact is reflected in the numerous internal

TABLE 1

Comparison of Council of Teaching Hospitals (COTH) with All U.S. Short-Term Hospitals, 1979–80

Indicator	Total Hospitals	COTH Hospitals	Percent of COTH Hospitals
No. of hospitals	5,984	329	5.5
No. of beds	999,627	186,670	18.7
No. of admissions	36,700,000	6,400,000	17.5
No. of patient days	277,000,000	55,500,000	20.1
No. of outpatient visits	127,000,000	38,500,000	30.3
No. of residents	56,350	40,775	72.4
Net patient revenue	$73,800,000,000	$18,900,000,000	25.7
Bad debts	$ 3,300,000,000	$ 1,200,000,000	35.4
Charity care expenditures	$ 1,300,000,000	$ 600,000,000	47.2

Sources: American Hospital Association surveys (2, 3).

and external controls or influences, beyond patients, which are an important part of teaching hospitals' operations. Internally, trustees, medical department chiefs, nurses, unions, medical staff members, medical school deans, and university officers all have important interests which must be acknowledged. Externally, accreditation and review bodies, regulatory and licensure agencies, major buyers of care, including governments and business, and grantors exert significant influence on the organization.

While medical staff matters are always delicate to deal with, the teaching environment and the departmentalized structure complicate this area. Sensitive relationships include those between full-time and part-time faculty members (the traditional "town-gown" arena), between chiefs and members of their departments, and between attending physicians and house staff members. In addition, teaching hospital staffs are usually two or three times larger than nonteaching hospital medical staffs. Questions of university versus hospital allegiance and goals also complicate the situation.

The pursuit of innovation adds another important dimension for teaching hospitals. The commitment to advancing understanding often requires the early implementation of new technology. This entails risk-taking and demands access to significant amounts of capital for its support. It may also generate conflict with regulators, who may have a different view of the relevance of this objective to the agency's mission of holding down costs. It may also generate goal conflict among the hospitals' organizational components as they compete for scarce resources.

Multiple missions imply multiple sources of finance. In some tax-supported teaching hospitals, funds are made available by governmental appropriation to finance some of these diverse activities. Private teaching hospitals, however, typically finance these programs with higher patient charges and inadequate philanthropy. Grants support research in both public and private hospitals. A consistent factor in all teaching hospitals is higher operating costs than in nonteaching hospitals. The Department of Teaching Hospitals reported that the average total expenses per adjusted admission in 1980 was 38 to 50 percent greater in COTH member hospitals than in non-COTH hospitals (3). The Yale-New Haven Hospital conducted a study of primary university-affiliated hospitals in 1979 and found that the expenses of this group were 37 percent higher per diem and 51 percent higher per adjusted admission than hospitals with limited affiliations; this reflected a longer length of stay.

Several factors account for these operating cost differences (2). The direct cost of operating graduate medical education programs typically amounts to about 4 percent of the operating expense. This includes the salaries and benefits of house staff members and those who are paid to supervise the program. Little evidence is available of the indirect cost due to inefficiencies resulting from training or to the unnecessary expenses incurred by inexperienced practitioners. There are offsetting savings from having available highly skilled and relatively inexpensive talent to handle care problems that might have to be covered in a more expensive way (4). In general, up to 6 percent or more of operating expense is typically committed to education.

Diagnostic case mix also contributes to higher costs. Teaching hospitals provide backup and specialized support for community hospitals. This is done through skilled specialists, whose practice is limited to narrow areas and enables the institution to offer tertiary care services. The breadth of the service attracts patients whose needs are unusual and whose care may demand more resources.

The stated mission of many teaching hospitals is to provide care to anyone who needs it. Their typical location in urban environments results in a disproportionately large volume of patients who have little or no resources to pay for care. Teaching hospitals provide 52 percent more of their revenue to support bad debts and charity than the average hospital (9.4 percent of their revenue for COTH hospitals compared with 6.2 percent for all hospitals) (3).

The teaching hospital's mission, location, and type of patient served require large ambulatory service programs. In addition, the growth of medical school faculties, whose practice is often based in the teaching hospital, adds to the need for large ambulatory services. Unfortunately, the inefficiencies of the teaching setting and the overhead allocation rules of cost reimbursers result in a cost per unit of ambulatory service that often greatly exceeds payment levels.

The diagnosis-related group, fixed-price payment program for Medicare is now a reality for hospitals. Whether or not adequate provision is made for the higher costs of teaching hospitals will depend upon individual institutional practices. A teaching allowance is included in the reimbursement formula and, in the short run, could be the difference between financial solvency and bankruptcy of some teaching hospitals. However, even if the allowance is adequate at the outset, understandable suspicion looms that it will be eroded over time, as were other provisions in past Medicare regulations. The prudent teaching hospital will begin planning now to supplement or replace funding support for its programs or see them abandoned due to inadequate resources.

Growth of Medical Schools

Enormous changes have occurred in U.S. medical schools, according to data compiled by the AAMC. Between 1959 and 1982, the federal commitment increased the number of schools by 48 percent (from 85 to 126), the number of students by 124 percent (from 29,614 to 66,485), and the number of residents by 208 percent (from 15,417 to 47,449). With increased federal support for more schools, more students, and more research, the increase in faculty members associated with these changes was 419 percent (from 10,350 to 53,748).

Table 2 displays shifts in the financing sources of medical schools. These changes will likely produce different results from those of the past two decades.

1. Total federal support has declined from 44.4 percent to 27.7 percent of total revenue.
2. Although state and local government support has increased slightly, total government support from all levels has dropped from 63.3 percent to 50.1 percent of total revenue.
3. Tuition and fees remain a minor source but have increased 54 percent in the proportion of income they provide.
4. Medical service revenue, or patient service fees, has increased 143 percent in proportion of total revenue. This area is receiving increased attention from faculties as a major source of flexible funds. Faculty practice growth presents a potential area of conflict between a faculty and its university, the faculty and the hospital, and the faculty and community-based physicians.

Discussion

What are the implications and how does the nonprofit teaching hospital cope with all the changes? Are there any steps other than trying, to the best of an institution's ability, to live within the resources and constraints which the environment presents? One strategy is characterized by the phrases "circling the wagons," "hunkering-down," "making-do," and "living within our means." This manner of coping seems predicated on the notion that the problem is temporary and will go away with time. While most things change given enough time, the circumstances now in motion will take a considerable time to play out and will fundamentally alter the structure of the health delivery industry.

If the teaching hospital wishes to preserve its multiple missions, it will have to devise multiple financing sources to underwrite them. Buyers of health services are moving to payment only for services received, not for subsidization of care for the poor, education programs, or other socially worthwhile purposes. Teaching hospitals are especially vulnerable to these changes and thus have a major incentive to be as innovative in their organization and management as they are in the development of new medical services.

The multi-institutional development that has characterized the hospital industry for the last few years has not yet involved many major teaching hospitals. The complexity of these organizations perhaps accounts for slower movement into multi-institutional relationships. However, teaching hospitals will have to

TABLE 2

Trends in Sources of Revenue of U.S. Medical Schools

(Dollars in Millions)

Source	1970–71		1981–82	
	Amount	Percent	Amount	Percent
Federal research	438	25.6	1,578	21.9
Other federal	322	18.8	415	5.8
State and local governments	323	18.9	1,617	22.4
Tuition and fees	63	3.7	413	5.7
Medical service	209	12.2	2,140	29.7
Other income	358	20.9	1,054	14.6
Total	1,713	100.0	7,217	100.0

Source: "U.S. Medical School Finances," unpublished report, Association of American Medical Colleges, 1983.

consider carefully new patterns of functioning in order to preserve the objectives which guide the enterprise. Some teaching hospitals may be able to survive independently, but most probably cannot. Whereas in the past, teaching hospitals were the larger institutions and able to garner resources sufficient to maintain a technological advantage, now multi-institutional groupings make large freestanding hospitals small by comparison. This may shift the resource advantages of size to the multi-institutional institutions and make the higher-priced, freestanding institutions even more vulnerable.

Control over operations has always been important in teaching hospitals. However, trustees will have to balance their desire for control versus their commitment to community service as expressed in institutional goals. If the goals can be met and society served, it should be less important where control resides.

Perhaps in the self-proclaimed role as guardians of the community's health, fulfilling a quasi-governmental function, teaching hospitals have assumed that they are best able to make decisions as to how a community expends its health care dollars. They were allowed to function relatively freely in the past, but concern about costs is changing the locus for decision-making away from providers. Buyers of care are now exerting control over decisions. The burden is to assure that the consequences of decisions are fully understood, including any untoward impact on a segment of patients or upon manpower training programs. This requires that teaching hospital leaders understand their role as advocates for those least able to speak up for their needs.

The missions of teaching hospitals proclaim a commitment to everyone's needs but the price of carrying out the commitment may become too high. The past income redistribution practices will not be available in a fixed price environment, especially if this method is adopted by all payers. Furthermore, with the demise of cost-based payment, hospitals will no longer be paid for what they do. Now hospitals must learn to do that for which they get paid. The distinction between these patterns is significant and far-reaching. If those who buy hospital services are willing to pay only for the services provided and nothing else—including subsidizing care of the poor or manpower training—then hospitals will either comply with such strictures or go out of business. Perhaps some hospitals or programs should close. However, the poor are likely to be the ones most affected by such terminations, as others can seek service elsewhere. Therefore, the only responsible option is to devise ways to reduce costs to levels which buyers are willing to pay.

In the short run, hospitals will react in several ways:

1. Product-line evaluations will result in the termination of programs which are not financially viable. The poor are especially vulnerable to such changes, as are weak training programs. The closure of high-cost, low-usage services will result in the shifting of patients who require specialized care, which will be available at fewer institutions. This could assist teaching hospitals by increasing their volume of tertiary services, provided that payment rates are sufficient.

2. Some shifting of patients may occur as health care providers seek to minimize their free care and bad debts. While hospitals and nonhospital providers may compete for remunerative ambulatory services, there is little competition to serve those with few or no resources. Means need to be developed to share this community responsibility, or teaching institutions will eventually collapse from

the unevenly distributed burden. Physicians, particularly those in community practices, should consider the long-term consequences of this pattern and their responsibilities to share some of the load with their teaching hospital colleagues.

3. Health services to the poor will be scaled down to essential services. Basic care will be provided without amenities which may be considered desirable but not critical. This will have an impact on training programs.

4. More careful financial screening will occur to assure that those receiving subsidized services are those who most need them. Patients eligible for governmental support will be required to show evidence of approval for care prior to receiving service.

5. Emergency care will continue to be provided by hospitals, but nonemergency care will be limited or deferred.

The longer view is always cloudier. However, a number of forces already in motion suggest probable nationwide trends that will ultimately affect all hospitals:

1. Prudent buyer efforts by government and business will force institutions to pare costs to levels purchasers are willing to pay. Hospitals will seek government-financed patients, even at reduced payment levels, to the extent that marginal costs are covered.

2. Multi-institutional development will enable vertically integrated providers to contract directly (perhaps via capitation) with buyers for a full range of services. Incentives will be developed to contain buyer expense and to place risk on providers as well as on patients.

3. Supported services will be limited to those deemed essential or with a demonstrable payoff. This will include funding for so-called "wellness" or prevention programs.

4. Hospitals will aggregate resources among themselves and with other providers to gain resource advantage of size, to spread risk, to share expertise, and to enhance competitive positions. Teaching hospitals will become associated with multi-institutional systems.

Despite the goals and hopes, two-tier care was never eliminated. In fact, there are several tiers, and, in health, as in other areas, personal resources determine each person's location. Perhaps limited resources make the "equal access, equal care" goal unattainable. Even if equal care is not achievable, just as there is not equality in education, nutrition, housing, or other important areas, there must be no retreat on the goal of equal access. Hospitals have long been the guardian of the disadvantaged, never doubting people's right to be served. What is at issue is how the financial burden will be handled.

Environmental forces demand that teaching hospitals focus on their essential purposes and seek alternative sources of support for programs in social welfare and medical education. In order to survive and thrive, these institutions will have to exchange some degree of control for new opportunities for growth. Failure to respond will erode the viability of the nation's teaching hospitals.

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Impact of Board Certification On Physician Practice Characteristics

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Abstract—In the study reported here, the authors, using data from two American Medical Association surveys, examine the impact of board certification on selected physician practice characteristics. The results indicate that board certification is more prevalent for certain specialties, ages, types of practice, and locations of practice. Board certification has a substantial impact on the gross income of most major specialties, but these differences decline significantly for net incomes. Finally, comparisons of the hours worked per week and weeks worked per year show only small differences between board-certified and nonboard-certified physicians.

An important aspect of the physician's career, the decision to obtain specialty board certification, is voluntary and does not appear to provide physicians with additional legal privileges in the practice of medicine. Moreover physicians are not required to limit themselves to the practice specialty in which they are certified. The certification boards are in no sense educational institutions, and the certificate of a board is not to be considered a degree (1). In short, board certification does not confer on any person legal qualifications or privileges, nor does it in any way interfere with or limit the professional activities of a licensed physician. To become board-certified in a specialty, a physician needs to complete the required graduate training and pass the board-certification examination.

In spite of the fact that board certification does not enhance a physician's legal qualifications, there are several reasons why a physician may be willing to fulfill the requirement to become board-certified. One major reason is that board certification may improve the possibilities for him to acquire admitting privileges to the hospitals of his choice. In addition, he may use board certification to help gain referrals. Finally, the board-certified physician is usually viewed by patients as having successfully completed certain additional requirements beyond those required for license.

In 1981 over 53 percent of all active physicians in the United States were board-certified (Table 1). This percentage had grown steadily since 1971, when only 36.7 percent of all active physicians were board-certified. Moreover, during the 1970s and early 1980s, board certification

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TABLE 1

Total Number of Physicians in the United States, the Number and Percentage of Those Board-Certified, and Annual Growth Rates for All Physicians and Board-Certified Physicians, 1971–1981

Year	Board-Certified Physicians	Total Physicians*	Percentage Board-Certified	Annual Growth Rate	
				Board-Certified Physicians	Total Physicians
1971	118,493	323,136	36.7	—	—
1972	125,787	325,710	38.6	6.2	0.8
1973	133,776	330,469	40.5	6.4	1.5
1974	139,707	336,774	41.5	4.4	1.9
1975	154,218	347,677	44.4	10.4	3.2
1976	157,444	356,283	44.2	2.1	2.5
1977	180,998	371,936	48.7	15.0	4.4
1978	194,566	384,615	50.6	7.5	3.4
1979	206,702	403,337	51.2	6.2	4.9
1980	224,394	425,716	52.7	8.6	5.5
1981	235,148	441,614	53.2	4.8	3.7

* Excludes physicians who were inactive and unclassified, whose addresses were unknown, and who were not involved in patient care.

Source: American Medical Association Physician Masterfile.

increased at an average annual rate of 7.2 percent. This means that the annual growth rate of board-certified physicians exceeded the annual growth rate for all active physicians by 4 percentage points. Nevertheless, despite this widespread growth in board certification, there have been few comprehensive investigations to examine the association between board certification and characteristics of the physician's practice (2–4).

The authors in this paper, using the most recent data available from two American Medical Association data sets, address the following questions concerning the relationship between board certifications and characteristics of physicians' practices. How does the distribution of board-certified physicians vary by specialty, sex, and age? How are board-certified physicians distributed among various practice arrangements and practice locations? How does board certification affect a physician's gross and net income and the number of hours he works?

Data Sources

The data used in the study to examine the income, hours, and weeks worked are from the annual core survey of the Socioeconomic Monitoring System (SMS) conducted in the second quarter of 1982 by the Center for Health Policy Research of the American Medical Association (AMA). This survey is part of a quarterly survey developed to collect data on physicians' practice characteristics, professional incomes and expenses, and fees. The survey is a random sample of active, office-based physicians in direct patient care-related activities who are not employed by the federal government. The sample used in the present study had 3,817 physicians. A detailed discussion of the survey methodology and sample characteristics has been presented by Henderson and White (5).

Data for the other variables, sex, age, type of practice, specialty, and practice location, were taken from the American Medical Association's 1981 Physician Masterfile, the most recent masterfile available. The masterfile contains information on every known physician in the United States, including ones who are not members of the AMA. To make this data source comparable with SMS data, only active, nonfederal, patient care physicians, excluding interns and residents, were included in the study.

Physician Distribution

Table 2 shows the number of nonfederal, patient care (NFPC) physicians and the percentage board-certified, by four specialty groupings, sex, and age. A much higher percentage of NFPC physicians were board-certified (62.2 percent) than total (federal and nonfederal) patient care physicians (53.2 percent) reported in Table 1.

The highest percentage of NFPC board-certified physicians was in the surgical specialties (74.3 percent). In contrast, only 39.9 percent of NFPC general practitioners were board-certified. The high percentage of board-certified physicians in the medical and surgical specialties probably reflects the importance of board certification in gaining hospital admitting privileges for these specialties. The lower percentage of board-certified physicians in general and family practice was probably due to the relatively recent development (in 1969) of a board-certification program in family practice. It might be expected with the passage of time that the low certification rate in this field will disappear.

More NFPC male physicians than NFPC female physicians were board-certified, 63.7 percent versus 46.7 percent, respectively (Table 2). Possible reasons for this were the relatively recent influx

TABLE 2

Number of Nonfederal, Patient Care Physicians and Percentage of Board-Certified Physicians by Specialty, Sex, and Age, 1981

Nonfederal Patient Care Physician	Number of Physicians*	Number Board-Certified	Percentage Board-Certified
Specialty			
General and family practice	51,000	20,350	39.9
Medical specialties	87,619	57,147	65.2
Surgical specialties	88,578	65,771	74.3
Other specialties	83,132	49,653	59.7
Sex			
Female	28,776	13,447	46.7
Male	281,553	179,474	63.7
Age			
<30	10,634	2,853	26.8
30–35	44,707	26,864	60.1
35–40	50,385	36,875	73.2
40–45	43,498	32,160	73.9
45–50	38,571	26,721	69.3
50–55	35,327	22,762	64.4
55–60	32,147	19,138	59.5
60–65	23,909	12,806	53.6
>65	31,151	12,742	40.9
Total	310,329	192,921	62.2

* Excludes physicians who were inactive and unclassified and whose addresses were unknown.

Source: American Medical Association Physician Masterfile.

of women into the medical profession and the fact that females have historically spent fewer years in residency training than their male counterparts.

The highest percentages of board-certified NFPC physicians were in the 35-to-40 and 40-to-45 age ranges, at 73.2 and 73.9 percent, respectively (Table 2). After the 40-to-45 age category, the percentages declined until the over 65 age category, in which only 40.9 percent of the physicians were board-certified. One likely reason that a low percentage of older physicians was board-certified is the recent growth in the number of specialties in which physicians can become board-certified.

Board-certified NFPC physicians dominated every type of practice arrangement in all the specialty groupings except solo practice and nongroup arrangements among general practitioners (Table 3). Of all the NFPC general practitioners located in solo practice, a vast majority were not board-certified. In the other three specialty groupings (for example, NFPC surgical specialists in group practice), the number of board-certified physicians exceeded nonboard-certified physicians by over five times. Clearly in most types of practice other than solo, it appears that physicians were more often than not board-certified.

For general family practitioners, the percentage of nonboard-certified physicians was larger than that of board-certified physicians in communities of every size (Table 3). Moreover, these differences grew larger when comparing physicians in Standard Metropolitan Statistical Areas (SMSA) with those physicians who were not located in SMSAs. (SMSAs must include one city with 50,000 or more inhabitants or two adjacent cities with a combined population of 50,000 or more.) That is, the relative difference in the number of board-certified and nonboard-certified physicians was larger in the SMSA communities than in those communities that were not SMSAs.

In the other three specialty groupings, only in the two nonmetropolitan community areas of less than 25,000 population did nonboard-certified physicians exceed the percentage of board-certified physicians (Table 3). For these three specialties, communities with more than 25,000 population all had greater percentages of physicians who were board-certified. This suggests that even though recent evidence has documented the growing movement of board-certified physicians to smaller and smaller communities (6, 7), in certain specialties (general/family practice) and certain communities (less than 25,000 population), the number of nonboard-certified physicians still exceeds the number of board-certified physicians. It should be reemphasized that this finding covers all active, nonfederal patient care physicians in the United States.

Incomes and Work Schedules

Board-certified physicians had higher gross incomes than their nonboard-certified counterparts (Table 4). With the exception of those in the medical specialties, all the differences were statistically significant. For physicians in the medical specialties, the difference in gross annual income was only $18,234 a year between board-certified and nonboard-certified physicians, while for physicians in surgical specialties the difference in gross income was $103,401.

There was a similar pattern of differences in net incomes (incomes after expenses but before taxes) for board-certified and nonboard-certified physicians (Table 4). Board-certified physicians across all specialties had higher net in-

TABLE 3

Percentage of Nonfederal, Board-Certified and Nonboard-Certified Physicians by Type and Location of Practice and by Specialty, 1981

Physicians' Practice and Location	General/Family Practice		Medical Specialties		Surgical Specialties		Other Specialties	
	Nonboard-Certified	Board-Certified	Nonboard-Certified	Board-Certified	Nonboard-Certified	Board-Certified	Nonboard-Certified	Board-Certified
Type of practice								
Solo	43.7	18.3	18.7	27.1	13.4	35.7	18.1	21.6
Partnership	6.0	7.4	3.6	12.5	2.7	16.7	3.4	9.3
Nongroup*	2.2	1.8	1.3	3.1	0.7	2.7	3.4	4.0
Group practice	7.7	12.3	5.9	22.2	3.7	20.9	8.9	23.4
Other†	0.2	0.6	0.9	4.8	0.4	3.1	1.7	6.3
Location								
Nonmetropolitan								
Less than 10,000	1.7	1.0	0.1	0.1	0.1	0.1	0.2	0.1
10,000–25,000	5.0	4.1	0.6	0.7	0.7	1.0	0.3	0.6
25,000–50,000	5.1	4.3	1.2	2.0	1.5	3.1	1.6	1.9
Greater than 50,000	4.9	3.9	1.8	3.6	1.8	5.2	2.3	3.3
Potential SMSA‡	0.9	0.6	0.4	0.9	0.4	1.3	0.6	0.8
SMSA								
50,000–500,000	11.0	8.6	5.5	12.3	4.6	15.7	7.2	11.4
500,000–1,000,000	6.5	4.2	4.8	9.1	3.4	10.5	5.1	8.0
1,000,000–5,000,000	17.6	10.2	13.8	26.3	9.4	27.8	15.8	24.4
Greater than 5,000,000	7.4	3.0	6.6	10.3	3.9	9.4	6.6	9.2

* Nongroup refers to physicians in practice arrangements with other physicians but not formally organized in a group practice.

† "Other" includes practices in corporations, voluntary organizations, and medical societies.

‡ SMSA = Standard Metropolitan Statistical Area. Potential SMSA is an area that is a future candidate for SMSA status.

Source: American Medical Association Physician Masterfile.

TABLE 4

Income and Working Time of Nonfederal, Board-Certified and Nonboard-Certified Physicians, by Specialty Groups, 1981

Physician Data	General/Family Practice		Medical Specialties		Surgical Specialties		Other Specialties		Total	
	Nonboard-Certified	Board-Certified	Nonboard-Certified	Board-Certified	Nonboard-Certified	Board-Certified	Nonboard-Certified	Board-Certified	Nonboard-Certified	Board-Certified
Income										
Gross	148,534*	215,476	161,321	179,555	141,270*	244,671	123,170*	195,204	141,832*	209,928
Net	70,982	78,250	77,200	84,168	84,378*	128,488	78,840*	104,197	77,334*	104,051
Working Time										
Hours per week	55.8*	58.4	58.4	57.6	55.5	57.0	54.1	54.3	55.8	56.5
Weeks per year	47.5	47.9	47.4	47.1	47.0	47.2	47.0*	46.5	47.3	47.0

* Differences between nonboard-certified and board-certified physicians are statistically significant at the $p = .10$ level.

Source: American Medical Association Socioeconomic Monitoring System.

comes than nonboard-certified physicians. However, only for the surgical specialties and "other" specialties were these differences significant. The discrepancy in net incomes between board-certified and nonboard-certified physicians was substantially less than the difference in gross income. For medical specialists, board certification meant only an additional $6,968 to net income, while for surgical specialists the added net income was $44,110. Since the difference between gross and net income is expenses, these differences show that some of the impact of board certification on gross income apparently is dissipated by expenses.

Only one significant difference was disclosed in hours worked per week between board-certified and nonboard-certified physicians (Table 4). Board-certified general practitioners worked, on the average, 2.6 hours more per week than nonboard-certified general practitioners. For all other specialty categories, the differences in hours per week were smaller and insignificant.

A similar picture emerged in comparisons of the weeks worked between board-certified and nonboard-certified physicians (Table 4). Only the "other" specialties category showed a statistically significant difference between board-certified and nonboard-certified physicians in the number of weeks per year worked, 46.5 versus 47.0, respectively. Of course, this difference is only half a week. For the other specialty categories, these differences were even less.

Conclusion

Board certification among U.S. physicians, in spite of its voluntary nature, has been increasing rapidly. Between 1971 and 1981, the annual growth rate in physicians obtaining board certification was 7.2 percent, while the annual increase in all physicians was only 3.2 percent. By the end of 1981, 53.2 percent of all U.S. physicians were board-certified, representing an increase of 16.5 percentage points over the percentage of physicians board-certified in 1971. An examination of nonfederal, patient care physicians shows that in 1981 a total of 62.2 percent were board-certified. If the growth rate of the 1970s and early 1980s continues through the 1980s, trend analysis shows that by the end of this decade nearly 70.4 percent of all physicians will be board-certified and that by the turn of the century nearly 90 percent will be.

The present investigation shows, however, that board certification is not uniform across the medical profession. Surgical and medical specialists (74.3 percent and 65.2 percent, respectively) were the most likely to be board-certified, while general practitioners were the least likely to be (39.9 percent). Male physicians had a much higher rate of board certification than female physicians (63.7 percent versus 46.7 percent). Physicians between the ages of 40 and 45 had the highest rate of board certification (73.9 percent), and before and after that age category the percent board-certified declined.

Board-certified physicians in all major specialties categories dominated each type of practice arrangement that was analyzed except for solo practice and nongroup arrangements, where nonboard-certified general practitioners were in the majority. Similarly, nonboard-certified general practitioners were in the majority in each analyzed size of communities, while board-certified physicians in the other three major specialty groupings dominated almost every practice location with the exception of communities with less than 10,000 population. These patterns of diffusion of board-certified physicians indicate that in 1981 board-certified, nonfederal, patient care physicians permeated nearly all types of practice and all practice locations.

Past evidence has suggested that there are significant differences in incomes and work patterns among board-certified and nonboard-certified physicians. While the results of the present study confirm these differences in incomes and work patterns, they reveal that these differences vary widely among major specialties. For example, net and gross incomes were significantly different for board-certified and nonboard-certified physicians in the surgical and "other" specialties but not for those in medical specialties. Overall, the number of hours worked per week or the number of weeks worked per year are not significantly different for the sampled board-certified and nonboard-certified physicians.

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Dentistry in Medical Education: Results of a Comprehensive Survey

James W. Curtis, Jr., D.M.D., Raymond S. Garrison, Jr., D.D.S., and Martha G. Camp, Ph.D.

Abstract—A survey of all U.S. and Canadian medical schools was undertaken to assess the current extent and nature of instruction in dental topics for medical students. The perceived importance of including such instruction in the undergraduate medical curriculum was ascertained, and barriers to teaching dental topics to medical students were identified.

In recent years medical education has emphasized treatment of the entire patient, as evidenced by the upsurge in primary care postgraduate programs. Even so, topics pertaining to dentistry and oral medicine are frequently neglected in these programs as well as in the general education of undergraduate medical students. The Department of Dentistry of Bowman Gray School of Medicine of Wake Forest University is currently introducing pertinent dental topics into the existing undergraduate curriculum. As a prelude to its curriculum proposal, the Department of Dentistry surveyed all U.S. and Canadian medical schools to assess the current extent and nature of instruction in dental topics for medical students. Information obtained from the survey was needed (*a*) to help guide and justify the local curriculum proposal, (*b*) to stimulate interest on a national level in medical institutions which currently provide little or no instruction on dental topics, and (*c*) to establish a data base for research into the effect of teaching such dental concepts to medical students.

Fifteen years ago Drinnan reported a similar but less detailed survey. His findings indicated that few institutions made a concerted effort to provide instruction in dental topics, yet the consensus response was that this area deserved more curriculum time (1). Since the mid-1970s, several articles and editorials have described the efforts of individual medical schools to teach dental topics to undergraduate students (2–8). Others have written on the similarity between medicine and dentistry and their need for mutual exchange (9–12).

Method

A two-page questionnaire was mailed at the beginning of academic year 1982–83 to the Group on Medical Education (GME) "correspondents" in all medical schools in the U.S. and Canada. (GME

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correspondents are individuals designated by the deans of medical schools to receive mailings from the Group on Medical Education of the Association of American Medical Colleges.) A cover letter accompanying each questionnaire explained the purpose of the survey and asked the correspondent to forward the questionnaire for completion, if necessary, to an appropriate person. Six weeks after the original mailing, a follow-up letter was mailed to all nonrespondents with another copy of the questionnaire.

The survey was structured to obtain information in seven areas: (*a*) what types of structured, formal associations with the dental profession existed in medical schools; (*b*) how important was the teaching of dental topics perceived to be; (*c*) when were dental topics taught during the four-year curriculum; (*d*) who taught dental topics in medical schools; (*e*) how many hours were being allotted to teaching dental topics and how many hours should be allotted; (*f*) which dental topics were being taught and which ones should be taught; and (*g*) what barriers were preventing or hindering the teaching of dental topics. This multicomponent approach also supplied a means to check the internal validity of the responses to the questionnaire. Additional comments were invited, and respondents were given an opportunity to request survey results. The raw data were compiled, encoded, and subjected to computer analysis.

Results

Of the 140 questionnaires sent, 127 (91 percent) were returned. Twelve were rejected as too incomplete for meaningful interpretation. The remaining 115 (82 percent) were acceptable for analysis. Eleven of the respondents were dentists.

Dentistry was integrated into medical school settings in a number of ways. The respondents reported a formal association of their medical school with a dental school in 46 cases (40 percent). Dental school faculty members were cross-appointed to the medical school faculty at 42 institutions (37 percent). Dentists were appointed to the faculty of 71 medical schools (62 percent). Only 14 medical schools (12 percent) reported having a department of dentistry in their organizational structure. Dentists on the faculties of medical schools were usually appointed to various departments other than dental departments: 38 (33 percent) in surgery, 2 (2 percent) in family medicine, 2 (2 percent) in medicine, 12 (10 percent) in pathology, or 20 (17 percent) in other departments. Of the medical schools reporting, 84 (73 percent) had a hospital dental service in their affiliated teaching hospitals, and 90 (78 percent) had dentists appointed to the staff at those hospitals.

The most common association of dentists with medical schools was through teaching hospital staff appointments and hospital dental services. The least common was a separate department of dentistry. In many institutions, more than one type of association exists. When the medical school maintained a relationship with a dental school, a dental department in the school, or dentists on the faculty, the authors defined such arrangements as an academically oriented association. Associations through hospital dental services or dentists with hospital staff appointments at affiliated teaching hospitals were defined as service-oriented.

Teaching dental topics in the undergraduate medical curriculum was perceived as important by 99 (86 percent) of the respondents. However, only 35 (30 percent) felt that the number of hours currently devoted to teaching such topics was adequate. Respondents at medical schools with dental departments unanimously agreed that teaching dental topics was important; perhaps because of high expectations, they less often considered the number of hours allotted to teaching dental topics as being adequate. Lectures on dental topics presented as components of other courses were reported in 75 (65 percent) of the medical schools, but only 6 (5 percent) had a formal or structured course on dentistry. Opportunities for clinical rotations in a dental facility were available in 35 (30 percent) of the responding schools. The greatest barrier to teaching dental topics was lack of curriculum time, as reported by 85 institutions (74 percent). Table 1 relates the amount of lecture and clinical instruction on dental topics included in the undergraduate medical curriculum to various organizational arrangements with the dental profession.

Table 2 shows the estimated number of hours allotted for dental topics and the number that the respondents felt should be allotted.

Schools with dental departments provided more time to the teaching of dental topics than schools without dental departments, according to the respondents. It was surmised that the large number of nonrespondents in each category resulted from the difficulty in assessing hours allotted when dental topics were covered in several different courses.

Table 3 provides responses to a comprehensive list of dental topics included on the questionnaire. Dental and oral anatomy were included in the curricula of 64 percent of the schools responding. Craniofacial growth and development and oral manifestations of systemic diseases were the only other topics taught by more than 50 percent of the responding institutions. Instruction on dental caries and periodontal diseases was reported by 22 percent of the respondents. Comparison of "taught" and "should be taught" responses indicates that respondents believed more instruction should be given in every topic.

Discussion

The results of the survey reported here provided significant insight into the current status of teaching dental topics to medical students in U.S. and Canadian medical schools. Individual responses ranged from no association with the dental profession, no dental topics taught, and no perceived need for dental instruction to dental departments fully inte-

TABLE 1

Percentage of Survey Respondents from 115 U.S. and Canadian Medical Schools Reporting Inclusion of Dental Topics in Undergraduate Medical Curriculum, 1982–83

Structure	Lectures				Clinical Teaching			
	Year 1	Year 2	Year 3	Year 4	Year 1	Year 2	Year 3	Year 4
Medical/dental schools formally associated	50	43	11	4	0	2	28	15
Dental department in medical school	43	43	14	14	0	14	43	43
Dentists on faculty	51	51	15	7	1	4	34	34
Dental service in teaching hospital	48	44	15	9	1	2	32	26
Dentists appointed to teaching hospital staff	47	43	13	8	1	3	30	27
Overall	44	45	14	7	2	4	29	26

TABLE 2

Percentage of Survey Respondents from 115 U.S. and Canadian Medical Schools Reporting Number of Hours Allotted and Hours That Should Be Allotted to Teaching Dental Topics in Undergraduate Medical Curriculum, 1982–83

Structure	Allotted Hours					Hours That Should Be Allotted				
	0	1–6	7–15	>15	No Response	0	1–6	7–15	>15	No Response
Medical/dental schools formally associated	13	22	15	6	43	0	15	15	4	65
Dental department in medical school	7	7	21	14	50	0	0	7	29	64
Dentists on faculty	7	28	23	7	35	0	7	18	13	62
Dental service in teaching hospital	11	30	20	6	33	1	12	20	11	58
Dentists appointed to teaching hospital staff	11	29	19	6	36	1	10	19	9	61
Overall	11	29	20	4	35	1	9	18	8	63

grated into the hierarchy of the medical school with greater than 15 hours of dental teaching provided. Although only 11 of the 115 respondents were dentists, a vast majority (86 percent) indicated that teaching dental topics was important. The percentage of institutions which provided lectures of dental topics as components of other courses (65 percent) closely related to the percentage of those teaching dental and oral anatomy (64 percent). No other topic was presented by more than 42 percent of the schools responding aside from dental and oral anatomy; craniofacial, oral, and dental growth and development; and oral manifestations of systemic diseases. Fewer than 25 percent of the responding institutions provided instruction on dental caries and periodontal diseases—two of the most common health afflictions found worldwide. Overall, very little instructional time is devoted to dental topics which have clinical applicability to the practicing physician.

The overwhelming barrier to teaching dental topics was perceived to be the lack of curriculum time. This is a barrier which must be addressed whenever any new material is introduced into an existing curriculum. The knowledge base for medicine is so rapidly expanding that time limitations pose major problems for all medical educators. Lack of faculty resources, identified as a barrier in approximately 25 percent of the responses, was not perceived to be a barrier by any of the medical schools which had dental departments and was a barrier in only 10 to 12 percent of the schools with an academically oriented association with the dental profession. A review of the responses relating to time allotted to teaching dental topics, what dental topics are taught, and availability of clinical rotations shows that there was a greater likelihood of teaching dental topics if a department of dentistry existed within the medical school. However, departments of dentistry were present in only 12 percent of the institutions responding. Still, approximately 75 percent of all medical schools did have some affiliation with dentists through a hospital dental service in their teaching hospitals or through the appointment of dentists to the staff of teaching hospitals. Teaching of dental topics occurred more readily when the relationship between the medical school and the dental profession was academically oriented (medical and dental schools formally as-

TABLE 3

Percentage of Survey Respondents from 115 U.S. and Canadian Medical Schools Reporting Dental Topics Taught and Topics That Should Be Taught in Undergraduate Medical Curriculum, 1982–83

Dental Topics	Taught	Should Be Taught
Dental nomenclature	23	44
Dental and oral anatomy	64	75
Craniofacial, oral, and dental growth and development	52	63
Dental occlusion	5	16
Etiology, prevention, treatment of dental malocclusion	6	27
Etiology, prevention, treatment of dental caries	22	47
Use of fluoride	29	49
Etiology, prevention, treatment of periodontal diseases	22	45
Dental infections	26	46
Oral manifestations of systemic diseases	56	70
Orofacial pain	40	57
Detection and team management of oral cancer	42	58
Dental and maxillofacial trauma	34	52
Oral and maxillofacial surgery	30	41
Dental restorations and prosthetics (such as fillings, crowns, and dentures)	3	13
Other	1	6

sociated, a dental department in the medical school, or dentists on the medical school faculty) rather than service-oriented (teaching hospitals with a hospital dental service or dentists on the hospital staff). Therefore, it appears that for dental topics to receive adequate attention in the undergraduate medical curriculum, an academically oriented dental environment is desirable.

Comprehensive instruction in dental topics to the undergraduate medical student does not take place in a majority of U.S. and Canadian medical schools, and, based on the survey responses, this appears to be a shortcoming in medical education. Although the number of hours needed to teach pertinent dental topics seems to be a small component of the overall four-year curriculum, curriculum time is at a premium.

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DATAGRAM

Inflation and Medical School Faculty Salaries

During the decade from 1973 to 1983, persistent inflation was a troublesome fact of life for medical schools and their faculties as well as for others. In this datagram, a 10-year span of faculty salary data is examined in order to determine how well medical school faculty salaries have kept pace with inflation. The data are derived from the annual series, *Report on Medical School Faculty Salaries*, of the Association of American Medical Colleges and from reports on the consumer price index published by the U.S. Bureau of Labor Statistics.

Annual mean compensation data for basic and clinical science faculty members are presented in Figure 1. During the 10-year period beginning in 1973, the unadjusted mean compensation increased by 93 percent for basic science faculty members and by 118 percent for clinical faculty members. After adjusting for inflation, however, real purchasing power declined by 14 percent and 3 percent, respectively. By way of comparison, the average constant weekly earnings of private nonagricultural workers declined by 13 percent over the same time period.

For basic science faculty members, purchasing power reached its nadir in 1981; for clinical faculty members, the low point was 1980. Both groups have recovered some real income in recent years. Clinical faculty members have access to earnings from their medical practice in addition to other university resources, and this may account for their less acute loss of purchasing power.

With respect to academic rank and constant dollar purchasing power (Figure 2), full professors fared best with a 14 percent decline for

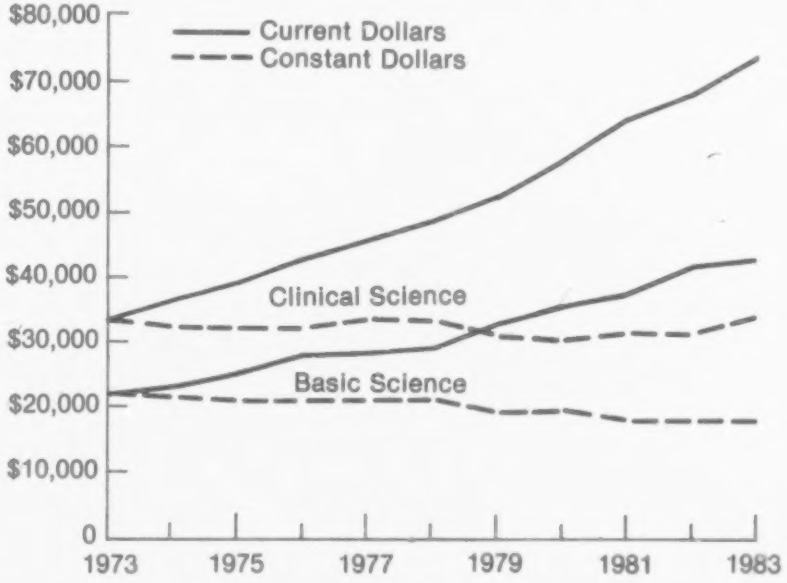

FIGURE 1
Annual mean salary for basic and clinical science faculty members in current (1983) dollars and constant (1973) dollars.

TABLE 1
Comparison of U.S. Medical School Faculty Annual Compensation, 1973–1983

		Basic Science Faculty				Clinical Science Faculty			
		Mean Salary				Mean Salary			
Year	Consumer Price Index	Current	Constant	Equivalent Required To Maintain 1973 Purchasing Power	Cumulative Decrease in Real Purchasing Power (percent)	Current	Constant	Equivalent Required To Maintain 1973 Purchasing Power	Cumulative Decrease in Real Purchasing Power (percent)
1973	100.0	$22,000	$22,000	$22,000	—	$33,600	$33,600	$33,600	—
1974	111.0	23,200	20,900	24,400	5.0	36,300	32,700	37,300	2.7
1975	121.1	25,000	20,600	26,600	6.4	39,400	32,500	40,700	3.3
1976	128.1	26,600	20,800	28,200	5.5	42,200	32,900	43,000	2.1
1977	136.4	28,000	20,500	30,000	6.8	44,900	32,900	45,800	2.1
1978	146.8	29,900	20,400	32,300	7.3	48,400	33,000	49,300	1.8
1979	163.3	32,000	19,600	35,900	10.9	52,000	31,800	54,900	5.4
1980	185.4	35,000	18,900	40,800	14.1	57,100	30,800	62,300	8.3
1981	204.6	37,700	18,400	45,000	16.4	63,700	31,100	68,700	7.4
1982	216.8	40,300	18,600	47,700	15.5	68,700	31,700	72,800	5.7
1983	223.4	42,400	19,000	49,100	13.6	73,100	32,700	75,100	2.7

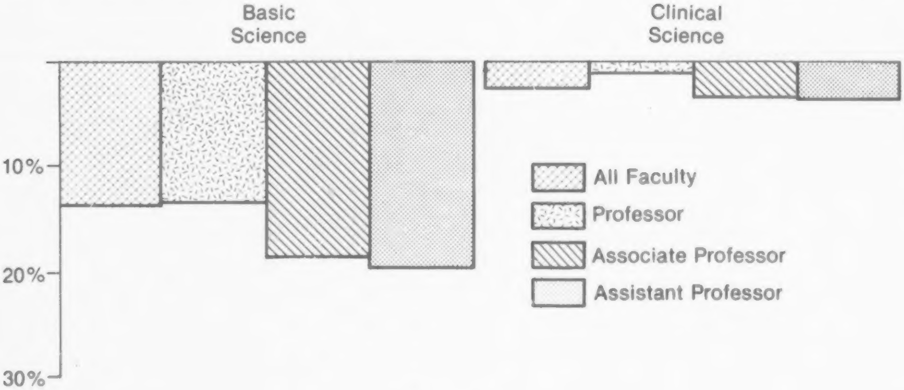

FIGURE 2
Cumulative decrease in real purchasing power, basic and clinical science faculty members, 1973–1983 (chairmen not included).

basic science professors and a 1 percent decline for clinical science professors. Assistant professors fared least well with respective constant declines of 20 percent and 4 percent. The cumulative decrease in real purchasing power of all basic science faculty members is not as unfavorable as one would expect from a quick review of the data for each of the three ranks, since there was a change in the distribution by rank during the period studied. In 1973, 29 percent of the faculty members were at the full professor rank, while in 1983 that fraction had climbed to 35 percent. For faculty members in the clinical departments, the corresponding percentages were 26 and 28 for 1973 and 1983, respectively.

In order to purchase in 1983 goods and services equivalent to those purchased in 1973, basic science faculty members would have had to earn a mean total compensation of $49,100 a year; likewise, clinical faculty members would have had to earn $75,100 (Table 1). Reflecting the decline in real purchasing power, the actual mean compensations were $42,400 and $73,100, respectively, for the two groups of faculty members.

These data indicate the relative worth of faculty positions in the aggregate over time and do not measure the income of individual faculty members. A newly hired assistant professor had more purchasing power in 1973 than a newly hired assistant professor in 1983, but the data do not show the effects of promotions or merit raises as they apply to individual faculty members. Because of this, one cannot conclude that individual faculty members have lost purchasing power during the last decade.

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Career Choice of 'Fifth Pathway' Graduates From New York State Medical Schools

Barry Stimmel, M.D., and Harry Smith, Jr., Ph.D.

Abstract—Graduates of "fifth pathway" programs at medical schools in New York state between 1976 and 1978 were studied to determine their professional careers and choice of medical specialties. Of the 545 physicians participating in the program, 510 were able to be located. Of this latter cohort, 177 (34.7 percent) had entered primary care fields as of 1981. Of the physicians no longer in residency training, 19.1 percent had full-time salaried positions in academic institutions, and the remaining physicians were engaged in various clinical medical activities. Of the 545 fifth pathway graduates, 74 (13.6 percent) had not been able to pass the licensing examinations as of 1981, and an additional 54 (9.9 percent) had not taken those examinations. Comparisons with regular students graduating from a medical school in New York state showed that fifth pathway graduates were more likely to select nonprimary care specialties than primary care specialties ($p < 0.001$). These data suggest that although a majority of graduates of fifth pathway programs in New York state are involved in the provision of health care, a small number are still unable to engage in the practice of medicine.

In 1971 the Council on Medical Education of the American Medical Association (AMA) published a policy statement concerning U.S. citizens graduating from Mexican medical schools to allow these individuals to become eligible to practice medicine in this country without obtaining a medical degree from the Mexican school (1). The inability of the student to obtain the degree is related not to academic performance but rather to the requirement of the Mexican government for an additional two years of clinical training after graduation, one being a year of social service.

A program described in the AMA statement, which has come to be known as the "fifth pathway" program, permits a student who successfully completes a year of clinical training under the supervision of an American medical school to participate in the National Resident Matching Program and to qualify for licensure. The fifth pathway graduates may never obtain the M.D., although at least one state has agreed to award this degree retroactively after the graduate has practiced medicine for three years in the state after completion of residency training. Although occasionally a person graduating from a foreign medical school other than one in Mexico may participate in this program to gain extra clinical training, the AMA and state licensing boards recognize the

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fifth pathway policy as pertaining only to graduates of Mexican schools.

As many as 41 American medical schools sponsored fifth pathway programs over the past decade, enrolling a total of approximately 2,500 students. The medical schools of New York state have been especially prominent in sponsoring such programs, enrolling approximately 55 percent of all fifth pathway students during the 1981–1982 academic year (2).

Although the fifth pathway program has become a well established track for entry into the practice of medicine, the program remains controversial and is not broadly accepted. The Association of American Medical Colleges (AAMC) has expressed concern about the program (3, 4). Since 1975 a committee of the Associated Medical Schools (AMS) of New York has been addressing the issue of U.S. citizens in foreign medical schools, focusing specific attention on fifth pathway programs in New York state (4). A centralized admissions process and admissions standards have been developed by each New York medical school for all of their affiliated institutions participating in fifth pathway programs, and data have been collected and forwarded annually to the AMS for analysis and review.

Data concerning specialty selection of graduates of fifth pathway programs in New York state and their ability to pass the Federation Licensing Examination (FLEX) of the Federation of State Medical Boards have appeared in a number of reports and publications (4–6). However, little information has been provided concerning the final specialty choice of these students, their professional activity, or the state in which they reside once their training has been completed. The authors in this report address these issues with analysis of data on those students who completed fifth pathway programs in New York in the classes of 1976 through 1978.

Description of Study

Information on all students completing fifth pathway programs in New York in June 1976, June 1977, and June 1978 was obtained from the following sources: (*a*) the National Board of Medical Examiners (NBME), with the approval of the Federation of State Medical Boards, on the performance of the students on the FLEX from June 1976 through June 1981 and (*b*) the Department of Data Release Services of the AMA. Career, licensure, and certification data from the AMA Physician Masterfile were obtained through 1981 on the fifth pathway graduates. No individual data existed concerning fail and pass rates on either the FLEX or certification examinations. Data concerning specialties were aggregated into primary care specialties (general internal medicine, general pediatrics, and family practice or general practice) and nonprimary care specialties, consisting of all other fields, including the subspecialties in internal medicine and pediatrics. Since over 95 percent of all of the participants were enrolled in Mexican medical schools, comparative analyses between the graduates' careers and country of origin of foreign medical school were not performed.

In order to provide comparative data about students graduating from a medical school in New York, demographic data on students from the Mount Sinai School of Medicine graduating in the classes of 1976 and 1977 were similarly reviewed. Statistical differences were tested utilizing chi-square.

Results

The three classes of fifth pathway graduates totaled 545. Information on the

TABLE 1

Selection of Specialties and Subspecialties by 510 'Fifth Pathway' Graduates, by Graduating Classes, 1976–1978, as of December 1981

Specialty	1976	1977	1978	Total	
				No.*	Percent†
Anesthesiology	3	11	8	22	4.3
Dermatology	1	2	1	4	0.8
Emergency medicine	5	4	4	13	2.5
Family practice	14	17	17	48	9.4
Internal medicine	23	40	42	105	20.6
Subspecialties	19	20	14	53	10.4
Neurology	2	0	0	2	0.4
Obstetrics and gynecology	13	22	20	55	10.8
Occupational medicine	0	1	0	1	0.2
Ophthalmology	4	7	6	17	3.3
Pathology	0	2	4	6	1.2
Pediatrics	6	6	12	24	4.7
Physical medicine and rehabilitation medicine	1	1	1	3	0.6
Psychiatry	11	11	11	33	6.5
Radiology	11	10	2	23	4.5
Surgery					
General	12	10	12	34	6.7
Neurosurgery	0	0	1	1	0.2
Orthopedics	6	13	12	31	6.1
Otolaryngology	4	5	2	11	2.2
Plastic	1	0	0	1	0.2
Urology	5	8	10	23	4.5
Total	141	190	179	510	100.1

* Numbers include those in professional activities and those still in residencies.

† Percentages do not sum to 100 percent due to rounding.

FLEX was obtained from the NBME on 491 (90 percent); the NBME had no record of the other 54 (10 percent) ever having taken the FLEX. Information from the AMA was obtained on 510 (93.6 percent) of the 545 physicians.

The individual specialty selections of the 510 fifth pathway graduates are displayed in Table 1. Internal medicine and its subspecialties represented the most frequent selection (31 percent). Surgery and its specialties were selected by 19.9 percent, and obstetrics was chosen by 10.8 percent. Separation of these specialties into primary care and nonprimary care showed that 177 (34.7 percent) entered primary care and that 333 (65.3 percent) entered nonprimary specialty care.

The medical professional activities in which the fifth pathway graduates were involved are listed in Table 2. The significant differences between career choices of the class of 1978 and the other two classes were mainly due to the fact that a majority of the 1978 graduates were still in residency training at the time of the data collection. If the resident category is eliminated from this analysis, then 54 (19.1 percent) graduates indicated that their major activity was in the academic field, and 229 (80.9 percent) indicated that they were engaged in clinical activities ($p < 0.001$).

TABLE 2

Choice of Professional Medical Activities of 510 'Fifth Pathway' Graduates, by Graduating Classes, 1976–1978, as of December 1981

Professional Activity*	1976	1977	1978	Total
Academic	18	22	14	54
Office	61	71	30	162
Hospital	15	10	6	31
Other	18	12	6	36
Resident	29	75	123	227
Total	141	190	179	510

* Chi-square ($df = 8$) = 82.699 ($p < .0001$). If resident category is eliminated, then chi-square ($df = 6$) = 5.034 ($p = .5395$).

An analysis of professional activity by primary care versus nonprimary care showed that the percentage of physicians going into nonprimary care specialties in the academic setting, 13.2 percent, was significantly higher than the proportion going into academic medicine in one of the primary care fields, 5.6 percent ($p <$ 0.01).

The number of fifth pathway graduates not obtaining licensure, based on data obtained from the NBME, is itemized in Table 3. Through June 1981, 74 students (13.6 percent of the total population of 545) had not passed the FLEX despite numerous attempts, and 54 (9.9 percent) had no record of ever having taken the examination. Licensure data obtained from the AMA revealed that 50 (9.8 percent) of the 510 graduates did not list themselves as having licensure. A comparison of licensed and nonlicensed physicians with respect to primary care and nonprimary care specialties did not reveal any significant differences with respect to distribution of the graduates between the two groups and licensure. However, if one reviews only professional activity, then a difference is observed; as might be expected, those graduates in academic medicine or in residency had significantly lower licensure rates than those engaged in clinical activities (87 percent and 83.7 percent versus 97.4 percent, respectively, chi-square = 24.806, $p < 0.001$). Of the total number of nonlicensed physicians, 37 (74 percent) were still in residency training.

TABLE 3

'Fifth Pathway' Graduates Not Passing and Not Taking FLEX for Licensure, as of June 1981

Class	No.	Not Passing FLEX		Not Taking FLEX	
		No.	Percent	No.	Percent
1976	154	23	14.9	18	11.7
1977	181	26	14.4	28	15.5
1978	210	25	11.9	8	3.8
Total	545	74	13.6	54	9.9

Comparative data on graduates of fifth pathway programs in 1976 and 1977 and those from the Mount Sinai School of Medicine (MSSM) for the same years showed several differences with respect to individual specialty selection (Table 4). The fifth pathway graduates were more likely to select family practice ($p < 0.025$) and radiology ($p < 0.01$) and less likely to select pediatrics ($p < 0.001$) than the MSSM graduates. Comparison of the selection of primary care specialties and the other specialties by these two groups (Table 5) also revealed significant differences. Individuals graduating from fifth pathway programs were more likely to select nonprimary specialty care than the Mount Sinai graduates ($p < 0.001$).

All of the graduates of the MSSM were licensed; almost all obtained licensure

TABLE 4

Comparison of Choices of Specialty or Subspecialty by 331 'Fifth Pathway' Graduates and by 148 Mount Sinai School of Medicine Graduates, Classes of 1976 and 1977, as of December 1981

Specialty	Fifth Pathway		Mount Sinai	
	No.	Percent§	No.	Percent
Anesthesiology	14	4.2	2	1.4
Dermatology	3	0.9	7	4.7
Emergency medicine	9	2.7	0	0.0
Family practice*	31	9.4	4	2.7
Internal medicine	63	19.0	27	18.2
Subspecialties	39	11.8	24	16.2
Neurology	2	0.6	1	0.7
Obstetrics and gynecology	35	10.6	12	8.1
Occupational medicine	1	0.3	0	0.0
Ophthalmology	11	3.3	5	3.4
Pathology	2	0.6	4	2.7
Pediatrics†	12	3.6	27	18.2
Physical medicine and rehabilitation medicine	2	0.6	0	0.0
Psychiatry	22	6.6	17	11.5
Radiology‡	21	6.3	1	0.7
Surgery				
General	22	6.6	5	3.4
Specialty	42	12.7	12	8.1
Total	331	99.8	148	100.0

* $p < 0.025$.
† $p < 0.001$.
‡ $p < 0.001$.
§ Percentages do not sum to 100 percent due to rounding.

TABLE 5

Selection of Primary Care Specialties and Other Specialties by Graduates of 'Fifth Pathway' and by Mount Sinai School of Medicine Graduates, Classes of 1976 and 1977, as of December 1981

Specialty	Fifth Pathway		Mount Sinai	
	No.	Percent	No.	Percent†
Primary Care				
Family practice	31	9.4	4	2.7
General internal medicine	63	19.0	27	18.2
Pediatrics	12	3.6	27	18.2
Other specialties*	225	68.0	90	60.8
Total	331	100.0	148	99.9

* Chi-square = 33.88 ($p < 0.001$).
† Percentages do not sum to 100 percent due to rounding.

through the NBME examinations. Certification by the American Board of Internal Medicine of fifth pathway graduates and of the MSSM graduates showed that 18 (17.6 percent) of the 102 fifth pathway graduates choosing internal medicine were certified as compared with 36 (70.5 percent) of the 51 MSSM graduates who chose internal medicine ($p < 0.01$).

An analysis of where fifth pathway and MSSM graduates located showed no essential difference between the percentages of fifth pathway graduates (52.3 percent) and MSSM graduates (48.7 percent) choosing New York state as their permanent residence.

Discussion

Although some information was obtained from the AMA on at least 93.6 percent of the fifth pathway graduates in New York from 1976 to 1978, the information pertaining to demographic characteristics of these physicians was based on self-reported data and, therefore, must be interpreted cautiously. The data obtained from the NBME were far more objective in providing evidence of the ability of these physicians to pass the FLEX. However, in the past it had been possible in several states for a physician to be licensed without taking either the FLEX or the NBME examinations. Although this route of licensure probably occurred infrequently, it must be kept in mind when reviewing data concerning those physicians who have never taken the FLEX before assuming that they are not practicing medicine. The use of a comparison group consisting of physicians graduating from one specific medical school rather than all of the medical schools in the state is also not without risk. However, data pertaining to the career choices of all graduates from those New York schools offering fifth pathway programs were not readily available.

The data suggest that graduates of fifth pathway programs in New York are involved in the provision of health care, with approximately one-half of these individuals choosing that state as their permanent residence. The fifth pathway graduates chose primary care specialties significantly less frequently ($p < 0.001$) than the MSSM graduates. However, again compared with the MSSM graduates, the fifth pathway graduates tended to enter family practice, anesthesiology, and emergency medicine more frequently. All of these fields are considered to be underserved by U.S.-trained physicians. More recent data, provided by the Associated Medical Schools of New York, indicate that an increasing proportion of fifth pathway students are choosing primary care specialties (61 percent in 1983 and 71 percent in 1984). Both fifth pathway and MSSM graduates chose to stay in New York in similar proportions upon completion of their residencies.

The quality of the training of fifth pathway participants after they complete fifth pathway programs and the quality of their medical practice are, of course, difficult to evaluate. On the FLEX, the pass rate of these students (79 percent) was considerably higher than those of other foreign-trained graduates (56 percent) ($p < 0.001$) yet lower than that of U.S. graduates (96 percent), according to data provided by the NBME. The dominant variable differentiating the training of these fifth pathway physicians from other foreign-trained physicians is apparently the fifth pathway program. The pass rates for fifth pathway graduates completing their training in later years have continued to improve.

Rosner and Mulvihill (7) presented data suggesting that the clinical performance of fifth pathway students during residency training is favorable. The data, however, must be tempered by the fact that many of these students usually are trained in residency programs of low acceptability to graduates of U.S. medical schools, and thus it is difficult to make peer comparisons. In fact, in the 1982 National Resident Matching Program match, 23 percent of the programs, which offered 2,200 positions or 12 percent of the total available positions, did not match with a single U.S. graduate.

Data concerning professional activities of fifth pathway physicians upon completion of their training indicate that a considerable proportion (19.1 percent) have obtained full-time, salaried positions in academic institutions. This figure is somewhat higher than the 13 percent reported on the basis of surveys on all U.S. physicians (8). Not unexpectedly, the greater proportion of fifth pathway physicians have gone into medical practice.

In attempting to determine the ability of these physicians to become certified in a given field, the authors chose certification by the American Board of Internal Medicine (ABIM) to illustrate the point for several reasons. Internal medicine represented the specialty chosen by the greatest proportion of the fifth pathway and the MSSM physicians. In addition, the requirements of other specialty boards would have prevented a significant number of fifth pathway physicians who graduated in the classes of 1976 and 1977 from completing the necessary requirements to qualify for certification by 1981, when the present study was terminated. The ABIM data revealed that fifth pathway physicians had a considerably lower rate of certification (17.6 percent) when compared with their U.S.-trained cohorts (70.5 percent) ($p < 0.01$). These findings are similar to those published by others, who have indicated that U.S. citizens trained abroad perform at levels significantly below the level of U.S.-trained physicians on the ABIM's certifying examinations as well as on other standard examinations (9, 10). The findings of the present study are also similar to those of French and Seman (11), who reported a 20 percent ABIM certification of fifth pathway program graduates in New Jersey.

It is difficult to correlate the information obtained from the AMA with that received from the NBME. If it is assumed that the 35 persons who did not file a professional activity report with the AMA were unable to obtain licensure, then there were 85 unlicensed physicians (15.6 percent of the total 545 fifth pathway students). Of the 50 persons reporting a professional activity to the AMA who had not obtained licensure, not unexpectedly 37 (74 percent) were still in residency training. It is assumed that the remaining 26 percent were practicing medicine under the supervision of a licensed physician. These data are similar to those of McGuinness and Mason (12), who found that 13 percent of 550 U.S. students 10 years after graduating from a foreign medical school had not qualified for graduate medical education in this country. An additional 61 (11 percent) had never become licensed practitioners.

Conclusions

In summary, the data in the present study indicate that physicians completing fifth pathway programs have developed skills to a greater degree than foreign-trained Americans not taking such programs, which allow a considerable proportion of the participants to enter academic medicine. The performance of these individuals on the FLEX has continued to improve, with later cohorts demonstrating passing rates as high as 90 percent. Although the enthusiasm of the AAMC for the fifth pathway programs has not appeared to be great (3, 4), these programs in New York state are facilitating the development of skills and entry of physicians trained in Mexican medical schools into the practice of medicine in New York state and thus fulfilling one of the major objectives of the program. Recent data from the National Resident Matching Program indicate that fifth pathway physicians are gaining increasing acceptance by the medical community. In the 1984 match, the match rate of these physicians was 78 percent, compared with 50 percent for osteopathic graduates and 44 percent for other U.S. citizens who were foreign medical graduates (13).

While these programs have been incorporated into the academic community of seven medical schools in New York, there is a possibility that fifth pathway programs will soon be extinct. Mexican authorities reportedly are considering discontinuing the requirement of two years of clinical service before the medical degree can be awarded in Mexico. Although the New York State Education Department allows graduates of a foreign medical school who have completed a residency and have practiced for three years in New York to receive a medical degree from the State University of New York, it is probable that, should the Mexican clinical requirement be discontinued, few, if any, students would choose the expense of an extra year of clinical training prior to entering a residency. If the Mexican requirements for licensure remain unchanged, however, the status of fifth pathway programs in New York still remains uncertain. The State Education Department is unenthusiastic about this program, and the State University of New York has announced its intention to discontinue the fifth pathway programs in state schools in the near future.

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Timing and Motivation in Pediatric Career Choices

Robert Adler, M.D., Barbara Marie Korsch, M.D.,
and Vida Francis Negrete

Abstract—A total of 257 third-year residents in pediatrics, internal medicine, and family practice were asked about their career goals for the year following their residency and in five years, and information was obtained from them about their motives for career choices. The authors specifically examined the following: humanitarian interests; intellectual motivation; service motives; and practical, personal, and financial considerations. The characteristics of the residency training program which may have influenced their career choices were also examined. A majority of the 214 pediatric residents said they had not considered going into pediatrics on entry to medical school. Of these residents, 109 planned academic pursuits for the following year, while only 81 of the 109 anticipated an academic career within five years. Intellectual stimulation, geographic location, and an "opportunity to clarify goals" were the three most frequently mentioned factors in choosing positions for the following year.

Career planning in medicine has been investigated for more than 100 years. Recent literature has documented some factors which influence individuals to seek a medical career and then motivate them to choose a particular specialty (1). In the spring of 1982, the authors of the present paper studied one cohort of third-year residents to explore the timing of their career selection, the types of careers chosen, and the motivation for their choices.

Background

Medical students' characteristics, (for example, demographic background, academic achievements, financial obligations, personality, and health) have been looked at in an attempt to find correlates to eventual career choices (1, 2). Positive correlations were found between general practice and the student's age, small community of origin, low socioeconomic background, and low academic status. Influences of the medical school experience, the exposure to faculty members as role models, the size of the operating budget, private versus public medical school, the ratio of the size of the school's clinical staff to that of the nonclinical staff (3–6), and the timing and sequence of patient exposure and rotations in medical school also affected career decisions (7). Funkenstein (8), in his study of Harvard Medical School students, stressed societal factors outside the medical school as a major

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influence in career choices. Although the magnitude of the impact of societal forces on career choices is hard to assess, the current interest in and emphasis on primary care has certainly had an impact on the orientation of today's medical students and residents.

Investigators have explored not only the nature but also the timing of career choices and have found that approximately one-fourth of those entering medical school maintained their career choices while the remainder changed their minds at least once during medical school (9). Another study showed that three-quarters of the undecided medical students made their decision in the last two years of medical school and that most make it after the third-year clerkship (5).

The influence of the residency years on subsequent career decisions has been poorly documented (10, 11). The impact of such factors as the resident's age, marital status, and academic achievement in residency on the resident's career choice has not been studied. There are no data to suggest how residents' attitudes or personal values relate to their career decisions.

Features of residency training programs which may influence career choices are of special interest to postgraduate medical educators, since these features may be subject to modification. Such features may include exposure to full-time faculty members and practicing community pediatricians as role models, exposure to different types of patients, the providing of opportunities for research and academic pursuits to the residents, the providing of opportunities to work in different types of settings, the stress of the training program, and the balance in the program of subspecialty rotations versus general and ambulatory experience. Again, there is little information available on how these factors affect career decisions.

One attempt to change career choice by modifying training has been to increase funding for primary care training programs. Preliminary studies of the primary care residency have shown a small increase in the number of residents who go on to primary care practice (12).

Societal factors working through economic incentives and the availability of jobs would seem to be more important to the resident about to finish his residency than to medical students. The resident's indebtedness and perceptions of what jobs will be available influence his planning, but again no data are available on how these may influence career choices.

Methods

A total of 342 questionnaires were mailed by the authors in May 1982 to third-year residents in 25 training programs, consisting of 21 pediatric programs, two internal medicine programs, and two family practice programs. The programs were chosen because they represented a variety of training settings (such as university- or community-based), program size, locations (such as urban and rural), and academic versus clinical orientations.

An eight-item questionnaire was developed that explored career decisions retrospectively, and an additional open-ended item was included that allowed for further comments regarding career plans. The authors were interested in career plans at the start of medical school and at the start of the residency, career plans for the year following the residency, and those for five years hence.

The questionnaire was also intended to obtain information as to the extent career choices were determined by the following: service motives and humanitarian interests, intellectual motivation, and practical, personal, or financial considerations. The authors also sought to find out whether characteristics of the residency training program could be identified that were influential in career choices.

Results

Of the 342 questionnaires that were mailed, 257 were returned. For all but two of the programs, the response rate ranged from 60 to 100 percent. The pediatric training programs sampled represented nine states, and the responding residents had attended undergraduate programs in 31 states and 10 foreign countries. Among the respondents were 214 third-year pediatric residents, of whom 119 were male and 130 were married. The remaining respondents were internal medicine and family practice residents.

PEDIATRIC RESIDENTS

Only 40 percent of those finishing their third-year pediatric training had considered going into pediatrics at entry into medical school. Thirty-five percent had changed their minds during medical school or the residency—22 changed from medicine to pediatrics, 11 changed from surgery to pediatrics, and 41 changed from other subspecialty choices. The remaining 25 percent had no definite career goal on entry to medical school. The clinical years in medical school and the completion of the first year of residency were the times when a majority of the career changes were initiated. Those residents who changed their career goals in medical school were more prone to mention disenchantment with the challenge and scope of private practice, whereas those who changed their minds during the residency more frequently attributed the change to disenchantment with academia. Those residents who mentioned humanitarian motives as having been important throughout their career choices were less likely to have had career changes than those who mentioned other motives.

A total of 109 of the pediatric residents planned academic pursuits for the following year. Of these, only 81 were anticipating an academic career after five years. For the next year, 19 chose to work in an emergency center or to take a fellowship in emergency medicine, 17 elected government or community service, 11 opted for prepaid group practices, and 17 were undecided or chose to enter another residency program. Forty-one respondents chose private practice for the next year. However, 79 anticipated being in general pediatric practice five years after their residency program ended (Table 1).

When the residents were asked which factors were considered "very important" in their choices of positions for the following year, intellectual stimulation, geographic location, and an "opportunity to clarify goals" were the three most frequently mentioned. The opportunity to help people and to give a higher priority to personal and family life were also frequent explanations.

The responses of the 99 pediatricians who stressed the opportunity to help people were examined to see whether intellectual stimulation was also an important factor in their career choice. Thirty-five did not rate intellectual stimulation as important; of these, all but eight chose practices as their probable career in five years, with most expecting to begin practice immediately after completing residency.

Twelve percent of the pediatric trainees responded that they chose their career because it would be enjoyable. Less frequently mentioned reasons were: a less demanding work schedule, indepen-

TABLE 1

Career Choices for 'Next Year' and 'In Five Years' of 214 Responding Pediatric Residents from 21 Programs, 1982

Career	'Next Year'	'In 5 Years'
Academia	109	81
Private practice	41	79
Emergency medicine	19	6
Government or community service	17	17
Prepaid group practice	11	14
Other or changing	17	17

dence, practical family pressures, and long-term security. Of 65 residents who found their residency extremely stressful, 12 chose emergency centers for the following year. Financial considerations figured in the decisions of 38 of the respondents, and debt repayment motivated 35 respondents. Only eight of the 42 pediatric residents who noted a need to repay debts as important in their career choice for the following year were ultimately planning academic careers.

Intellectual stimulation was deemed very important by 82 percent of those who chose academic careers for the following year. Of this group, 47 percent planned to continue in academic careers in five years compared with only 38 percent in the overall pediatric sample. Of those who chose academic pediatrics, role models during training were reported as very important. The pediatric respondents from residency programs in academic medical centers tended to look for intellectual stimulation and were more likely to anticipate academic careers in the future. Respondents who planned academic careers were unlikely to state that giving high priority to family or personal life was an important basis for their decision. Women who were in residency programs in academic medical centers and chose an academic future were not likely to feel that their gender had been crucial in their career choice.

When asked to rate which training experiences influenced their career choices, 101 respondents mentioned the educational environment, and 94 noted "exposure to certain types of patients." "Disenchantment with the challenge and scope of private practice" as experienced during training was rated as very important in their career choices by 56 of the pediatric trainees. Role models were rated as very important by 43.

Of the pediatric residents who were remaining in academic medicine for the following year, 64 gave definitive statements about their plans. Of these, 15 chose chief resident positions, 18 chose intensive-care-related fellowships, 8 chose areas related to public health, 2 were going to pursue a Ph.D. program, and the remainder chose assorted subspecialties.

OTHER RESIDENTS

The sample of internal medicine and family practice respondents was so small that no detailed analysis was undertaken on these data. The internists answering the questionnaire differed from the pediatricians in that 75 percent, compared with 43 percent of the pediatricians, felt that role models had been important in their career decision-making. Exposure to certain kinds of patients was a less frequent explanation of career choice for the internists. The opportunity to help people was reported as a motivating factor by only 25 percent of the internists. Only one internal medicine candidate mentioned enjoyment as motivating his career choice.

Discussion

In the pilot study described here of career choices made by pediatric residents, the authors explored when these choices were made and what factors motivated them. The study showed that only 40 percent of the pediatric residents had intentions of pursuing a pediatric career when they entered medical school. Changes in career choice were found to occur often during the third year of medical school and after completion of the first year of residency. This finding confirms other studies showing that a majority of career changes occur during the third year of medical school training. Therefore, significant opportunity exists to influence career decisions of trainees.

Paiva and colleagues (7) emphasized that pediatric role models in the third year of medical school had a profound influence on the students' eventual decision to go into pediatrics. Some residents in the present study indicated that they became disenchanted with the scope and challenge of private practice during medical school and, therefore, planned to pursue an academic career after their residency program. During the second year of residency, the changes tended to be in the direction of private practice, as the trainees became disenchanted with academia.

There has been concern that the increase in indebtedness of medical students will by necessity influence their career goals and, in fact, may have a profound effect on the ability of individuals from some socioeconomic levels to pursue a medical education. Forty-two of the respondents in the present study stated that they had chosen a career enabling them to repay debts incurred during medical training. As the impact of decreased financial aid and the rising cost of medical education has become more acute in the last two years, the full effect of this trend may not yet be visible.

One part of the present investigation focused on the choice of an academic career in pediatrics. The residents who had plans for academic medicine consistently rated intellectual stimulation as a major motivation. These residents generally did not stress family needs and priorities or personal considerations, and gender did not influence those women who opted for academic careers. Residency programs based in academic medical centers were frequently the source of future academicians. Whether these programs had been elected because of an earlier academic interest or were influencing such planning cannot be determined from the data. Role models, both positive and negative ("disenchantment with private practice"), were influential for those choosing academic medicine. As indicated earlier, financial indebtedness appears to preclude choices of careers in academia. Therefore, improving funding for medical studies and providing academic stimulation, including strong academic role models, might increase the number of pediatric residents choosing careers in academic pediatrics.

It is discouraging to note that, unlike the future academicians, the residents who chose private practice were unlikely to report that they expected intellectual stimulation in their future careers. Humanitarian motives consistently and practical considerations frequently were paramount in this group. These findings may relate to the generally acknowledged disenchantment and dissatisfaction experienced by pediatricians in private practice (13). A circular phenomenon of unstimulating, dissatisfied practitioner role models discouraging candidates with a quest for intellectual stimulation could be postulated. An active search for more competent and inspiring practitioners to participate in graduate education could break the cycle.

Stress is a significant component of all pediatric training programs, and some investigators have suggested that many residents had "burned out" at the completion of their training and, therefore, would choose a career goal without a major commitment (14, 15). The authors of the present study were curious as to whether there is a trend for physicians to work temporarily in an emergency center in order to avoid any long-term commitment and to escape making close relationships with patients while at the same time making a substantial income in a short period of time. The results of the study show that 9 percent of the pediatric residents did, in fact, elect an emergency center position for the year following the residency, especially those residents in residency programs based in academic medical centers who felt stressed by their experience. Only a few of these anticipated a lifetime career in emergency medicine; nevertheless, it would seem that the stressful training experience may influence initial career choices.

In conclusion, it appears that there may be ways to modify the medical school curriculum and graduate pediatric education to influence career decisions. Further study of the quality and timing of the pediatric clerkship, of patient exposure, and of the impact of role models in medical school is needed. Graduate pediatric education also should receive more systematic study. The amount of stress experienced by the trainees, the amount of intellectual stimulation, the research experience and other challenging learning opportunities, role models encountered, and the debts incurred during medical education are only some of the factors which may influence residents in their career choice.

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COMMUNICATIONS

Findings on Geriatric Medicine and Gerontology From the NBME Examinations

Edmund H. Duthie, Jr., M.D., Robert A. Kirsling, and Michael B. Donnelly, Ph.D.

Seven years have elapsed since the release of the report, *Aging and Medical Education*, by the Institute of Medicine (IOM) of the National Academy of Sciences (1). In the interim, much has been written regarding geriatric medicine as it relates to medical education (2–4). In 1983 the Association of American Medical Colleges (AAMC) published a document, "Undergraduate Medical Education Preparation for Improved Geriatric Care," which "provides guidelines for faculty use in assessing how well their education and training programs are preparing the next generation of physicians to treat the elderly with dignity and understanding and to deal more effectively with their medical and psychosocial problems" (5). Given the interest in geriatric medicine and gerontology, it is the purpose of the authors in this study to assess how much content in these areas was included in Part I and Part II of the National Board of Medical Examiners (NBME) examinations, how well students performed in these areas compared with other areas, and whether the amount of content had changed since the IOM report in 1978.

Materials and Methods

The questions on the 1983 NBME Part I and Part II examinations were reviewed by a geriatrician (E.H.D.) and a research assistant (R.A.K.) to determine the amount of geriatric medicine and gerontology content. The AAMC geriatric assessment guidelines for curriculum content were used to assist in item classification (5). IOM guidelines were employed for items dealing with pathology, since this was not included in the AAMC report. Items were initially categorized as (*a*) unquestionably reflecting geriatric medicine or gerontologic content, (*b*) peripherally relating to geriatric medicine or gerontology, or (*c*) nongeriatric. For obvious reasons, the pediatric portion of the NBME Part II examination and the obstetric questions of the obstetrics/gynecology portion were not included in the analysis. Data are reported as the number of items with gerontologic content and as a percent of all items on a given subject. When enough items (operationally defined as greater than five) were found to permit comparison, difficulty levels of gerontologic items were compared with nongerontologic items for all students who took the examinations. Testing data were based on a nationwide sample comprised of 12,069 students on Part I and 12,344 students on Part II. Item difficulty was defined as the percent of examinees answering the item correctly.

Results

Table 1 shows the results of the analysis. The subtests with the most geriatric content on the Part I examination were Behavioral Science (13.5 percent of all items) and Pathology (8.8 percent). Very few gerontology items were found among the other five subtests. In the Part II examination, Psychiatry contained the most geriatric items (11.0 percent), with the other subtests reporting a somewhat similar

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The study reported here was supported in part by a geriatric medicine academic award (K07 AG-00178-02) from the National Institute on Aging.

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TABLE 1

Number and Percent of Gerontology Items on the 1983 Examinations of the National Board of Medical Examiners and Mean Percentage of National Sample of Students Answering Gerontology and Nongerontology Items Correctly*

	Gerontology Items		Students Answering Correctly†				
Subtest	No.	Percent	Gerontology		Nongerontology		
			Mean Percent	S.D.	Mean Percent	S.D.	
Part I							
Anatomy	1	0.7	—	—	—	—	—
Physiology	1	0.7	—	—	—	—	—
Biochemistry	2	1.4	—	—	—	—	—
Pathology	12	8.8	64.5	20.0	60.1	20.0	0.72
Pharmacology	1	0.7	—	—	—	—	—
Microbiology	0	0.0	—	—	—	—	—
Behavioral Science	19	13.5	64.0	23.9	66.9	21.1	−0.48
Part II							
Medicine	11	7.1	77.4	13.8	69.7	18.6	1.71
Surgery	8	5.2	61.1	22.2	65.3	19.9	−0.52
Gynecology	5	6.6	—	—	—	—	—
Preventive Medicine	10	6.5	76.6	17.2	69.4	19.6	1.19
Psychiatry	17	11.0	64.7	23.6	65.9	19.6	−0.20

* The total number of students taking the 1983 NBME examinations was 12,069 for Part I and 12,344 for Part II.

† Blanks indicate that results of subtest were not analyzed because of the small number of gerontologic items in the test.

number of items as a percent of the total (from 5.2 to 7.1 percent). The total mean percentage of gerontologic items was 3.8 percent on Part I and 7.3 percent on Part II.

When enough items were present to permit comparison, *t*-tests were used to test differences between the percentage of students answering gerontologic and nongerontologic items correctly. In all cases, the differences were not significant.

Discussion

In its 1978 report, the IOM reviewed the 1977 NBME examinations for "age-related" content (1). The report estimated that 4 percent of the questions on Part I and 5.6 percent of the questions on Part II were age-related. Gerontology item analysis by subtests was not made.

Despite a growing elderly population and widespread acknowledgment of the need for student exposure to geriatric medicine, the NBME examinations have changed very little in this area in the past five years. Course directors, department chairmen, deans, and students find little incentive to increase the emphasis on geriatric medicine or gerontology if certifying examinations do not place much emphasis on these areas. Particularly notable for a paucity of questions on gerontology are the areas of physiology and pharmacology. There is a large amount of information in both areas which needs to be learned by people who will be caring for adults. For example, it is estimated that elderly patients consume 25 percent of the drugs prescribed in the United States (6) yet compose only 12 percent of the population. Unfortunately, some major textbooks (7, 8) have yet to identify gerontology as a separate content area for students to study. The Behavioral Science and Psychiatry subtests of the NBME examinations have more geriatric/gerontologic content than do the other subtests. Questions on delirium, dementia, depression in later life, and psychosocial changes with age were found regularly.

The NBME examinations are psychometrically well constructed as determined by consistent student performance on the gerontologic and nongerontologic items. Thus, it might be concluded that medical students are acquiring gerontologic knowledge in a similar degree to acquiring knowledge in other areas, as measured by the NBME. The results reported here were limited, since only half of the NBME subtests were analyzed due to the small number of gerontologic items in the others (6 out of 12).

The question arises concerning how much content is enough. Although the elderly account for 12 percent of the population in the United States, they account for 37 percent of short hospital stays and 85 percent of the long-term-care beds (9). Practitioners who care for adults recognize the considerable amount (up to 50 percent) of time which they spend caring for their elderly patients (10). Standardized examinations should reflect topics which are important for students to know in order to be competent practitioners. The lack of emphasis on geriatric medicine and gerontology seems inappropriate given the demographic trends and considering physician utilization by elderly persons. It may be appropriate, therefore, to consider including a gerontologic subtest within the examinations of the National Board of Medical Examiners.

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Factors Affecting the Selection of Psychiatry And the Distribution of Psychiatrists

Earl L. Loschen, M.D., Gabriella M. D'Elia, Ph.D., and M. Patricia Sheehan

Issues in the recruitment of physicians into psychiatry and the maldistribution of psychiatric manpower have been common topics of concern since the middle of the last decade. Investigators have examined a variety of demographic and educational factors influencing recruitment into psychiatry and the distribution of health manpower. However, studies about recruitment have generally not been concerned with issues of psychiatric man-

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DATAGRAM

House Staff Expenditures and Funding In COTH Member Hospitals

For 16 consecutive years, the Department of Teaching Hospitals of the Association of American Medical Colleges (AAMC) has conducted a survey of house staff stipends, benefits, and funding for members of the Association's Council of Teaching Hospitals (COTH). This year's survey includes the mean and median reported stipend levels for each of six post-M.D. years of training for 1983–84 and 1984–85.

These data are further aggregated by region, affiliation, type of ownership, and bed size of reporting hospitals. In addition, comparative data allow an analysis of the various benefits provided to the house staff and their dependents, including health and nonhealth benefits such as parking privileges, the provision of meals, life insurance, and leave time allowed. Finally, the survey presents information on trends in stipend levels, total hospital expenditures for stipends and benefits, and the sources used to fund these expenditures. This Datagram highlights certain data from the AAMC publication, *1984 COTH Survey of Housestaff Stipends, Benefits, and Funding.* The 1984 survey was mailed to 433 members, and at least partial responses were received from 355 COTH hospitals, an 82 percent response rate.

Stipends

The mean stipend levels reported for 1984–85 continue a trend of smaller percentage increases for individual stipends. The nationwide mean increased approximately 4.7 percent in 1984–85 for first-year house staff members over the previous year. Table 1 illustrates

TABLE 1

Dollar and Percentage Increases in Mean House Staff First-Year Stipends, COTH Member Hospitals, 1969–1985

Academic Year	Mean First Post-M.D. Year Stipend (in dollars)	Dollar Increase Over Previous Year	Percentage Increase Over Previous Year	Percentage Increase in Consumer Price Index* (all items)
1969–70	7,325	—	—	—
1970–71	8,115	790	10.8	5.9
1971–72	9,198	1,083	13.3	4.3
1972–73	9,698	500	5.4	3.3
1973–74	10,114	416	4.3	6.2
1974–75	10,692	578	5.7	11.0
1975–76	11,685	993	9.3	9.1
1976–77	12,371	686	5.9	5.8
1977–78	13,145	774	6.3	6.5
1978–79	13,904	759	5.8	7.7
1979–80	14,811	907	6.5	11.3
1980–81	16,017	1,206	8.1	13.5
1981–82	17,301	1,284	8.0	10.3
1982–83	18,910	1,609	9.3	6.0
1983–84	19,868	958	5.1	3.1
1984–85	20,808	940	4.7	4.4

* CPI figures are calendar year figures. That is, the increase in the fifth column represents the percentage increase in the Consumer Price Index between January 1 and December 31st.

Source: U.S. Bureau of Labor Statistics.

TABLE 2

COTH Member Hospital Expenditures for Resident Stipends and Fringe Benefits, 1983–84

Hospital Category	Resident Expenditures		Resident Expenditures as a Percent of Hospital Operating Budget	
	No. of Hospitals	Mean (in millions of dollars)	No. of Hospitals	Mean (in millions of dollars)
All Responding Hospitals	343	3.72	313	3.5
Geographic Region				
Northeastern	136	3.83	123	3.6
Southern	64	3.82	58	3.8
Midwestern	99	3.40	90	3.1
Western	44	3.98	42	3.6
Affiliation Relationship*				
University-owned	56	6.40	50	4.5
Major affiliate	243	3.32	222	3.4
Limited affiliate	38	2.22	36	2.7
Hospital Ownership*				
State-owned	42	5.88	38	4.6
Municipally-owned	28	5.20	25	4.3
Church-owned	42	2.71	39	2.7
Other, nonprofit	166	3.73	149	3.2
Veterans Administration	63	2.38	61	3.8
Hospital Bed Size				
399 or less	90	2.40	82	3.5
400 to 549	100	3.24	92	3.4
550 to 699	62	3.46	56	3.4
700 or more	91	5.74	83	3.6

* For reasons of confidentiality, some responding hospitals were excluded from these categories.

that this increase was reflective of the increase in the overall consumer price index.

The report includes specific information on the variation in first-year stipend levels. For example, hospitals in the southern region, those with a strong affiliation relationship, and those that are state-owned report the lowest stipend levels overall.

Expenditures

The total hospital expenditure for residency stipends and benefits for 343 hospitals responding to this question was $1.3 trillion; the mean was $3.7 million (Table 2). The mean percent of the hospitals' operating budget spent on residency stipends and benefits was 3.5 percent, but these percentages ranged from 0.1 to 9.8 percent.

The mean level of expenditures for residency stipends and benefits was highest in state- and municipally-owned hospitals, where the mean expenditures were $5.9 million and $5.2 million, respectively. University-owned hospitals were also atypically high, with a mean for these expenditures of $6.4 million.

Funding

The predominant source of funding for house staff stipends and benefits is patient revenues (Table 3). Approximately 81 percent of the costs of residency stipends and benefits was derived from this source in 1983–84, and patient revenues supported 60.9 percent of similar costs for fellowship programs. In the past, the National Institutes of Health (NIH) has been the second largest source of funds supporting clinical fellows (9.1 percent in 1982–83), while the physician fee revenue percentage

TABLE 3

Percentage Distribution of Funding Sources Used To Pay Hospital Costs of House Staff Stipends and Fringe Benefits, All Responding COTH Hospitals (Excluding VA Hospitals), 1983–84

Funding Source	Source of Revenue*	
	Residents	Clinical Fellows
Patient revenues and general operating appropriations	81.10	60.92
State appropriations earmarked for house staff expenses	4.98	2.30
Municipal appropriations earmarked for house staff expenses	1.19	0.64
Veterans Administration appropriations	1.98	4.04
Physician fee revenue	0.60	9.03
Medical school/university funds	1.91	2.35
National Institutes of Health	0.29	8.75
Other federal agencies	0.27	0.88
Endowment income	0.03	0.52
Foundation grants/voluntary agencies	0.43	5.40
Other	7.23	5.18

* The number of hospitals responding to the question concerning the funding sources of residents' stipends and benefits was 280, and the number for clinical fellows was 97.

was low (2.9 percent). Data from this year's survey place physician fee revenues in the second largest category for supporting clinical fellows with 9.0 percent and the NIH at 8.8 percent.

Conclusion

As indicated by the results of the survey, the funding of house staff stipends and fringe benefits is dependent on support from patient care revenues. With the current federal emphasis on cost-containment, the validity of supporting this educational process from patient care dollars is being questioned. Although the AAMC firmly believes this to be an appropriate source, an ad hoc committee on the financing of graduate medical education has been established to evaluate both traditional funding sources and proposed alternative sources.

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Office Procedural Skills in Family Medicine

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Abstract—In a study of 131 residents, 34 faculty members, and 236 graduates at nine family practice residency programs in Iowa, 29 office and outpatient procedural skills (for example, repair of lacerations) were identified as representing the ideal core content for family practice residency training, and another 11 procedures (for example, endometrial biopsy) were identified as elective procedures. The faculty members' responses that residents were taught these 40 procedures by direct supervision were much higher than third-year residents' reports of having been supervised while performing them. There was a positive relationship between the percentage of residents who reported having been supervised and the percentage who felt competent to perform the procedures. There was strong agreement among faculty members, residency graduates, and the residents that residents should be evaluated by direct observation of their performance of both core and noncore procedures. Therefore, the view that evaluation by direct observation would be resisted by residents is not supported by this study. As a result of these findings, the authors encourage programs to establish processes for assessing and documenting residents' performances of office and outpatient procedures.

All residency programs should have as their goal the training of competent physicians. To help assure competency, it is useful to define a set of performance criteria for residents within the specialty. These criteria can be used as guides for evaluation and, as a result, for curriculum revision.

In an effort to improve the training and evaluation of office and outpatient procedures in family practice, the authors undertook the present study for the following reasons: (*a*) to develop a list of office procedures in which graduating residents should be proficient, (*b*) to assess the degree of competency residents feel they have in office procedures, (*c*) to determine the extent to which residents are supervised in their performance of office procedures, and (*d*) to determine the attitudes of faculty members, residency program graduates, and residents regarding the need for direct supervision and evaluation of a resident's performance of office procedures.

Since there are regional differences in the practice of family medicine and since the present study pertains to residents, faculty members, and graduates of family practice programs in Iowa, the findings may not be generalizable to other regions or states.

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Background

In family practice, as in other primary care specialties, the abilities of a physician can be categorized into three areas: (*a*) attitudes and interpersonal skills—the behavior and ethics of the profession that are necessary for communicating and working with the patient, the patient's family, and other health care personnel; (*b*) intellectual faculties and abilities—cognitive knowledge, ability to organize and to synthesize, and clinical judgment necessary for medical problem-solving; and (*c*) motor and technical skills—the manual skills required to conduct a physical examination and to perform necessary procedures.

Procedural skills should be demonstrated to the resident and evaluated by direct observation of the performance of these skills. A minimal set of 39 procedural skills (both inpatient and outpatient) has been defined by the American Board of Family Practice (1). This board has charged residency programs with developing methods for documenting achievement of these procedures. The Family Practice Residency Assistance Program, which represents both the American Academy of Family Physicians and the American Board of Family Practice, was established to aid in the development of excellence in residency training programs in family practice. Although the program lists curriculum content requirements and recommends the evaluation of residents and the documentation of their experiences, it mentions procedural skills only in the areas of obstetrics and gynecology (2).

Training in and evaluation of office and outpatient procedural skills are of particular importance in family practice for several reasons. First, there is an increasing desire by the government, insurance companies, and patients for procedures to be done on an outpatient basis. Such procedures not only reduce health care costs but also avoid the inconvenience of a hospital stay for the patient (3). It is essential that family physicians in rural areas be well trained in office and outpatient procedures, since other specialists are not always readily available for referral and the nearest hospital may be many miles away.

Second, office procedures, such as those listed in Table 1, are reimbursed at an hourly rate from six to 10 times higher than cognitive skills that might be used in a routine office visit. The income from performing procedures is an important source of office revenue.

Third, although many procedures can be safely performed in an office setting, even relatively common procedures, such as proctosigmoidoscopic examinations and casting of simple fractures, can be associated with significant morbidity if not performed correctly. Training and supervised experience in such procedures are mandatory during the residency program. Such training should include instruction in the proper utilization of facilities, equipment, and assistants.

Finally, documentation of a resident's ability to perform certain procedures may be useful in obtaining hospital privileges. Many procedures that can be done on an outpatient basis are frequently listed on hospital privilege request forms, and residency program directors may be asked to certify a resident's competency to perform such procedures.

Method

Spivey developed a technique for using a formal survey to determine curriculum content (4). He stated, "One basic assumption of this technique is that many individuals, representing multiple backgrounds and viewpoints, and not just the teachers of a discipline, should be consulted to determine content." His technique of surveying qualified individuals to determine what they consider to be the minimum abilities acceptable has been used in developing and evaluating undergraduate medical curriculum (5) as well as in measuring the adequacy of various aspects of family practice residency programs (6, 7). Spivey's method has also been successfully applied in determining which procedural skills (both inpatient and outpatient) should be learned by internal medicine residents (8, 9). In these studies by Wigton and Steinmann, a core of procedural skills was identified that can be used for the training and evaluation of internal medicine residents.

The questionnaire used in the present study, conducted in 1982, was based on Spivey's technique and was developed in three stages. First, a list of office and outpatient procedural skills was compiled from (*a*) informal discussions with faculty members and residents in the University of Iowa Family Practice Residency Program, (*b*) personal experience of one of the authors (L.G.H.), (*c*) Iowa City area hospital privilege request forms, and (*d*) the literature (8–10). A preliminary list of about 70 items was then reviewed by the authors with University of Iowa family practice faculty members and residents and reduced to 40 basic or essential procedures (Table 1). Most of the items eliminated were felt to be either primarily inpatient or antiquated procedures. Several items not generally considered procedures (for example, interpretation of Gram's stains, electrocardiograms, chest x-rays, cultures) were included because they were felt to be items that residents could be expected to learn during residency.

In the second stage, the questions to be asked of faculty members, residency program graduates, and current residents were developed. One question common to the questionnaires for the faculty, residency program graduates, and current residents was, "Should a graduate family practice resident be able to perform this procedure?" In addition, faculty members were asked: "Are residents taught this procedure by direct supervision during residency?" "Have you directly supervised residents performing this procedure?" Graduates of the residency program were asked: "Were you adequately trained to perform this procedure by the time you left your residency?" "Do you perform this procedure now in your practice?" Residents were asked: "Have you been directly supervised during residency while performing this procedure?" "Do you feel competent to perform this procedure independently?" For these questions, possible responses were limited to "yes" or "no."

A final question requiring a "yes" or "no" response was asked of all survey participants: "Do you feel residents should be evaluated by direct observation of their performance of the above procedures?" Space was left at the end of each questionnaire for the respondent to suggest other procedures and to add comments.

The questionnaires were sent to a survey population consisting of all full-time clinical faculty members, residency program graduates, and current residents at the nine family practice residency training programs in Iowa. Those not responding to the initial mailing were sent an identical questionnaire approximately four weeks later. Questionnaires were returned by 34 of 35 faculty (97 percent), 131 of 157 residents (83 percent), and 236 of 266 residency program graduates (89 percent) for a total response rate of 88 percent (401 returned).

TABLE 1

Percentage of Affirmative Responses by 34 Clinical Faculty Members, 236 Residency Program Graduates, and 131 Current Residents at Nine Family Practice Residency Training Programs in Iowa to Question on Whether Graduate of Family Practice Program Should Be Able To Perform Selected Procedures, 1982

Procedure	Faculty	Graduates	Residents	Overall
Core				
Fluorescein eye examination/foreign body removal	100	100	100	100
Repair and closure of lacerations	100	100	100	100
Cerumen removal from ear	100	100	100	100
Electrosurgical or cryosurgical destruction of skin lesions	100	100	100	100
Incision and drainage of abscesses	100	100	100	100
Control of nasal hemorrhage	100	100	100	100
Proctosigmoidoscopic examination	100	100	100	100
Pelvic examination	100	100	100	100
Pap smear	100	100	100	100
Diaphragm fitting	100	100	100	100
Venipuncture	100	100	100	100
Reduction and casting of simple fractures	100	100	99	100*
Removal of ingrown toenail	100	100*	100	100*
Chest x-ray interpretation	100	100*	100	100*
Skin biopsy (shave, punch, or excisional)	100	100	99	100*
Wet mount/potassium hydroxide preparation of vaginal discharge	100	100*	99	100*
Electrocardiogram interpretation	100	99	100	100*
Intrauterine device insertion	97	99	100	99
Microscopic examination of urine	100	99	99	99
Tonometry (Schiötz)	100	98	99	99
Joint aspiration and injection	100	97	100	98
Indirect laryngoscopy	100	98	96	98
Gram's stain of sputum and interpretation	97	94	100	97
Spirometry and interpretation	100	96	96	97
Suprapubic tap on infant	97	95	99	96
Injection of trigger points	100	97	94	96
Aspiration of breast mass	100	94	95	95
Excision of external thrombosed hemorrhoids	100	91	92	92
Preparation and interpretation of cultures (urine, throat)	94	92	91	92
Noncore				
Endometrial biopsy	100	89	91	91
Proctosigmoidoscopic examination with biopsy or polypectomy	94	90	87	89
Cervical (uterine) biopsy	97	89	84	88
Peripheral blood smear preparation and interpretation	94	83	94	87
Vasectomy	91	87	83	86
Audiometry and interpretation	85	84	77	82
Injection or ligation of internal hemorrhoids	78	76	83	79
Treadmill stress-testing and interpretation of results	83	75	75	76
Myringotomy	61	67	77	70
Split thickness skin graft	67	67	59	65
Lymph node biopsy	69	58	60	60

* Indicates value rounded to 100 percent.

Results and Discussion

The data obtained from the survey were analyzed to determine whether there was a consensus among the faculty members, residency program graduates, and current residents as to which of the 40 procedures they felt were important for residents to learn.

CORE PROCEDURES

For each of the 40 procedures, Table 1 gives the responses of each of the three groups to the question, "Should a graduate family practice resident be able to perform this procedure?" There were 13 procedures in which 100 percent of the faculty, residency graduates, and current residents agreed program graduates should be proficient. There were 16 additional procedures for which more than 90 percent of each of the three groups were in agreement that program graduates should be able to perform. This group of 29 "core" procedures, shown in Table 1, represents a minimal set of office and outpatient procedures that those surveyed felt family practice residents should be able to perform upon graduation from their residency. Many of the procedures that did not receive at least a 90 percent agreement rate among all three groups tended to be associated with greater potential morbidity.

SUPERVISION

Table 2 shows the responses of 45 third-year residents to the question of whether or not they had been directly supervised during residency while performing each procedure. Also in Table 2, the authors list the responses of faculty members as to whether residents were taught each procedure by direct supervision during their residency and whether they themselves had directly supervised residents performing each procedure. There was generally a large discrepancy between the residents' reports of the amount of direct supervision and the faculty members' reports that residents were supervised during the residency in performing these procedures. For all cases except suprapubic taps on infants, proctosigmoidoscopic examinations, chest x-ray interpretation, and electrocardiogram interpretation, the percentages indicated that the surveyed faculty members believed that the residents were being supervised to a greater extent than the residents reported they were being supervised.

There was also a considerable difference between the responses concerning whether the faculty members had personally supervised the residents in a particular procedure and whether the faculty members believed the residents were taught the procedure by direct supervision during the residency. Apparently the faculty members believe that supervision of the residents performing these procedures was occurring to a large extent outside the family practice offices, perhaps on specialty rotations. This, however, appears to be an erroneous assumption due to the number of third-year residents who felt they had not been directly supervised in many of these procedures.

COMPETENCE AND SUPERVISION

The authors sought to answer the question of whether there was any relation between the supervision a resident received while performing a procedure and his competency to perform the procedure independently. For residents in each year of training, their mean responses were analyzed for the two questions: "Have you been directly supervised during residency while performing this procedure?" "Do you feel competent to perform this procedure independently?" With minor

TABLE 2

Percentage of Affirmative Responses by 45 Third-Year Residents and 34 Clinical Faculty Members at Nine Family Practice Residency Training Programs in Iowa to Questions Dealing with the Supervision of Residents Performing Office and Outpatient Procedures, 1982

Procedure	Resident Response to Question on Direct Supervision*	Faculty Response	
		Taught by Direct Supervision†	Personal Supervision‡
Fluorescein eye examination/foreign body removal	77	100	82
Repair and closure of lacerations	95	100	94
Cerumen removal from ear	66	90	75
Electrosurgical or cryosurgical destruction of skin lesions	93	100	94
Incision and drainage of abscesses	95	100	91
Control of nasal hemorrhage	69	90	59
Proctosigmoidoscopic examination	100	100	94
Pelvic examination	91	97	88
Pap smear	82	94	81
Diaphragm fitting	77	100	81
Venipuncture	73	79	69
Reduction and casting of simple fractures	91	100	84
Removal of ingrown toenail	79	100	78
Chest x-ray interpretation	100	100	87
Skin biopsy (shave, punch, or excisional)	91	97	84
Wet mount/potassium hydroxide preparation of vaginal discharge	82	90	81
Electrocardiogram interpretation	100	100	84
Intrauterine device insertion	79	100	80
Microscopic examination of urine	77	86	67
Tonometry (Schiötz)	73	96	69
Joint aspiration and injection	78	100	88
Indirect laryngoscopy	71	90	41
Gram's stain of sputum and interpretation	61	89	44
Spirometry and interpretation	75	85	59
Suprapubic tap on infant	82	81	31
Injection of trigger points	64	90	66
Aspiration of breast mass	53	88	44
Excision of external thrombosed hemorrhoids	49	93	81
Preparation and interpretation of cultures (urine, throat)	55	74	44
Endometrial biopsy	50	89	39
Proctosigmoidoscopic examination with biopsy or polypectomy	49	90	47
Cervical (uterine) biopsy	39	85	34
Peripheral blood smear preparation and interpretation	48	70	28
Vasectomy	75	97	47
Audiometry and interpretation	39	71	31
Injection or ligation of internal hemorrhoids	30	56	25
Treadmill stress-testing and interpretation of results	64	71	12
Myringotomy	29	42	19
Split thickness skin graft	36	71	25
Lymph node biopsy	29	56	28

* "Have you been directly supervised during residency while performing this procedure?"

† "Are residents taught this procedure by direct supervision during residency?"

‡ "Have you directly supervised residents performing this procedure?"

exceptions reported below, each level of residents reported a progressively higher percentage of having been supervised in doing the procedures. The mean positive response to this question was 42 percent for first-year residents, 60 percent for second-year residents, and 68 percent for third-year residents. The residents reported a similar trend in their competency to perform these procedures independently; the mean positive response rate was 57 percent for first-year residents, 68 percent for second-year residents, and 79 percent for third-year residents. While the percentage of residents claiming competency was significantly greater ($p <$ .007) than the percentage who reported having been supervised, there was a direct positive correlation (ranging from 0.823 to 0.887, $p < .001$) between the percentage of residents at each level who reported having been directly supervised and the percentage who felt competent to perform the procedure. This correlation, however, did not establish a causal link between supervision and competence.

Two further points can be made from these data. First, there were several procedures (fluorescein eye examination, repair of lacerations, cerumen removal, pelvic examination, Pap smear, venipuncture, and wet mount/potassium hydroxide preparation of vaginal discharge) for which the percentage of residents reporting competence was much higher than the percentage who had been supervised during residency. These core procedures were probably learned in medical school. Second, third-year residents indicated that for four procedures (split thickness skin graft, proctosigmoidoscopic examination with biopsy or polypectomy, vasectomy, and treadmill stress-testing and interpretation of results) the percentage who had been supervised was higher than the percentage who felt competent to perform the procedure.

A comparison was made of the percentage of third-year residents who felt competent to perform each procedure with the percentage who felt a residency program graduate should be able to perform the procedure. For slightly more than half of the procedures (21 of 40), more than 90 percent of the third-year residents indicated competence, and all of these 21 procedures were on the list of 29 core procedures.

More disturbing, however, was that less than 90 percent of the graduating residents felt competent in the remaining 19 procedures listed. For the following core procedures, the percent of third-year residents reporting competency ranged from 60 to 89 percent: joint aspiration and injection, injection of trigger points, control of nasal hemorrhage, excision of external thrombosed hemorrhoids, aspiration of breast mass, spirometry and interpretation, Gram's stain of sputum and interpretation, and preparation and interpretation of cultures (urine, throat). Thus, there were a large number of third-year residents who did not feel as well trained as they would like to be for many of these procedures.

How did the perceptions of competency in the third-year residents compare with the retrospective opinions of graduates as to whether they had been adequately trained in these procedures by the time they left their residency training? For 26 of the 29 core procedures, the value of the self-ratings of third-year residents was equal to or higher than those of the graduates. The mean differences, however, were not statistically significant. For all the noncore procedures, except injection or ligation of internal hemorrhoids, the graduates claimed to have achieved a higher level of skill during their residency training than that level reported by the third-year residents.

More than 80 percent of the graduates

reported that they were currently performing the core procedures. The core procedures performed least commonly in practice were cultures (75 percent), spirometry (68 percent), Gram's stain (65 percent), and suprapubic tap (64 percent).

PROCEDURAL TRAINING AND USE

Comparisons were made of skills at graduation ("Were you adequately trained to perform this procedure by the time you left your residency?") with their use in current practice ("Do you perform this procedure now in your practice?"). For 33 of the 40 skills, there was a strong positive correlation ($p < .01$) between the graduates' responses to these two questions. This indicates that a residency program graduate is unlikely to perform a procedure in practice if he feels he was not adequately trained in that procedure during residency. For each of the 11 noncore items, there was a significant positive correlation ($p < .01$) between having the skill at graduation and using it in the graduate's practice. This was also true of the 13 lowest-ranked core items. Residents who had mastered these skills by the time they graduated were more likely to use them in their practices than if the skills had not been mastered.

OBSERVATION AND EVALUATION

The respondents strongly felt that residents should be evaluated by direct observation of their performance of the procedures. The "yes" responses to the question were 100 percent by the faculty, 98 percent by residency program graduates, and 86 percent by current residents. By year of residency training, the percentage of "yes" responses increased from 77 percent in the first year to 83 percent in the second year to 95 percent in the third year. The overall percentage of respondents who felt that residents should be evaluated by direct observation was 94 percent. These results, together with written comments from residents on the questionnaire, indicated that the residents were willing to undergo evaluation in their performance of the procedures and saw the lack of such evaluation as a residency program weakness. The results also showed the increasing recognition of the usefulness of such evaluation by residents as they progress through their training.

Over half of the respondents supplied additional remarks on resident evaluation. Most of the remarks associated with a "yes" response to the question of evaluation emphasized that direct observation of residents performing procedures was the only logical and adequate way these techniques could be evaluated. Educators should, the residents said, teach the procedures more purposely and directly by giving immediate constructive feedback in order to correct errors and help refine the resident's technique.

Comments made by those who felt evaluation was not necessary generally indicated that the evaluation process would involve too much "red tape" or that, while supervision might be appropriate, evaluation was not. Some residents felt that they had had enough evaluation in medical school.

Summary

In brief, there were seven major results of this study:

1. There was a set of 29 office and outpatient procedures which responding faculty members, residency program graduates, and current residents strongly agreed a graduating resident should be able to perform.
2. Faculty members believed residents were taught procedures by direct supervision to a much greater extent than the residents reported they were actually supervised.
3. Faculty members believed that they

did not do most of the supervising of residents performing these procedures.

4. There was a positive correlation between the percentage of residents who had been supervised and the percentage who felt competent to perform each procedure; this was especially true for the more complex procedures.

5. There were several procedures which residents nearing graduation felt they should be able to perform but did not feel competent to perform.

6. The residency graduates were less likely to perform in their practices those office and outpatient procedures in which they had not been adequately trained than those in which they feel competent.

7. Faculty members, residency program graduates, and residents overwhelmingly agreed that residents should be evaluated by direct observation of their performance of office and outpatient procedures.

Conclusions and Recommendations

Three limitations should be considered in interpreting the results of this study: (*a*) although the graduates who were studied were practicing in several states, the study has limited geographic generalizability; (*b*) the study was one of perceptions of what is important; and (*c*) no cognitive measures of knowledge about procedures were used.

Training in office and outpatient procedural skills should be a formal part of a family practice residency program curriculum. The list of 29 core procedures should be seriously considered as part of the list of required procedures for programs. The remaining noncore procedures, which are more complicated, could then form an elective group of procedures the resident might choose to learn if he so desired.

More extensive training in office and outpatient procedures in these programs should be provided than is presently done. Some of these procedural skills can be taught initially through the use of patient simulators, such as the latex colon for sigmoidoscopy or pigs' feet for suturing (11), or by "patient instructors" who have been used successfully for teaching pelvic and rectal examinations (12). The use of simulators, however, is never a substitute for performing the procedures on actual patients, and the use of professional patients is limited to very few procedures.

The family practice clinical faculty members must assume greater responsibility for the supervision of residents in their performance of the desired procedures than they presently do. Both faculty members and residents agree that such supervision is necessary, although it is not always clearly accomplished. This lack of intense supervision by family practice clinical faculty members may be the result of a mistaken impression that residents are being supervised by other specialists in their performance of office and outpatient procedures. On the other hand, residents, while performing these procedures, should be more active in seeking supervision from the clinical faculty members in the family practice offices. Residents should not assume that they are performing a procedure correctly and would not benefit from further supervision because it is relatively simple or because it was done in medical school. Residents do, in fact, seem to be more willing to be supervised as they progress in their residency training.

Finally, a process should be established for assessing and documenting residents' performance of office and outpatient procedures. This evaluation would require more time, money, and effort than the evaluation of cognitive knowledge, since it would require that faculty members observe the residents directly. These procedures, however, are an important part of a family physician's skills and should be evaluated in an effective manner. Neither this study nor any other study has provided evidence that direct observation creates a stressful or tense situation, interferes with the resident-patient relationship, or would for these reasons be resisted by residents (13, 14). Any stress introduced by the evaluation process can be reduced by focusing on the teaching of the procedure rather than on the evaluation per se, by having the residents involved in establishing the evaluation process for these procedures, and by providing prompt, constructive feedback to the resident as part of the training and evaluation process (13).

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DATAGRAM

Results of the NRMP for 1985

The number of U.S. seniors who enrolled in the National Resident Matching Program (NRMP) in 1985 increased by 49 from a year ago (1). The number who subsequently withdrew decreased by 59 (Table 1), and the number of active applicants increased by 108. The proportion who were unmatched decreased by 57 (0.4 percentage points).

The total number of U.S. and Canadian citizens (U.S. seniors, "fifth pathway" students, graduates of foreign medical schools [FMG], physician candidates [earlier U.S. graduates who are seeking an entering position in graduate medical education], and osteopathic and Canadian graduates) who applied to the match this year increased by only 5. Among the other U.S. and Canadian citizens, the number of fifth pathway applicants decreased from 425 to 407; 352 participated in the match, and 81 percent were successful.

TABLE 1

Participation in the National Resident Matching Program in 1985

Category	U.S. Senior Students		Other U.S. and Canadian Citizens*		Alien Foreign Graduates		Total Applicants	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent
Applicants	16,179	100.0	5,332	100.0	6,943	100.0	28,454	100.0
Withdrew	1,330	8.2	2,051	38.5	2,687	38.7	6,068	21.3
Active participants	14,849	91.8	3,281	61.5	4,256	61.3	22,386	78.7
Matched	13,753	92.6	1,635	49.8	918	21.6	16,306	72.8
Unmatched	1,096	7.4	1,646	50.2	3,338	78.4	6,080	27.2
Total	14,849	100.0	3,281	100.0	4,256	100.0	22,386	100.0

* Other U.S. and Canadian citizens include graduating students from U.S. osteopathic schools and Canadian medical schools; physician candidates, that is, earlier U.S. graduates who are seeking an entering position in graduate medical education; "fifth pathway" students, who are U.S. nationals who completed course requirements for a medical degree abroad followed by a year of clinical training in a U.S. hospital under medical school sponsorship; and U.S. foreign medical graduates.

The number of graduates of osteopathic schools who initially applied to the match increased by 52 percentage points to 631, a 1.5-fold increase since 1983; 59 percent were matched. The number of physician applicants increased only slightly, and 51 percent were successful in the match.

The number of FMG who applied decreased by 503. Of the 9,562 who applied, 2,619 were U.S. citizens; the number of U.S. FMG decreased by 10 percentage points, but the number unmatched increased by 4 percentage points to 60 percent. The number of alien FMG decreased by 3 percentage points, and the percentage unmatched remained at 78 percent.

The number of positions offered for the first postgraduate year increased by 78; 161 more were offered in the generalist* specialties than in 1984 (Table 2), an increase of 0.6 percentage points to 64.9 percent. The ratio of positions per initially-enrolled applicant was 0.7, that of positions per all U.S. senior and other U.S.-Canadian citizen applicant was 0.9, and that per U.S. senior was 1.14. The ratios for active applicants in the match were, respectively, 0.83, 1.02, and 1.25.

The overall filling of positions increased by 1 percentage point, the filling of positions by U.S. seniors by 0.2 percentage points, and the filling by other applicants by 0.8 percentage

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*"Generalist" specialties are defined as family practice, internal medicine, obstetrics/gynecology, and pediatrics.

TABLE 2

Positions Offered and Filled by Specialty and Type of Applicants in the NRMP in 1985

Specialties	Positions Offered		Applicants Matched											
			U.S. Senior Students			Other U.S. and Canadian Citizens‡			Alien Foreign Graduates			Total Applicants		
	No.	Percent*	No.	Percent *	Percent †	No.	Percent *	Percent †	No.	Percent *	Percent †	No.	Percent *	Percent †
Family practice	2,372	12.8	1,626	11.8	68.5	232	14.2	9.8	40	4.4	1.7	1,898	11.6	80.0
Internal medicine	6,736	36.3	4,997	36.3	74.2	673	41.2	10.0	426	46.4	6.3	6,096	37.4	90.5
Pediatrics	1,899	10.2	1,287	9.4	67.8	190	11.6	10.0	213	23.2	11.2	1,690	10.4	89.0
Obstetrics/gynecology	1,021	5.5	828	6.0	81.1	128	7.8	12.5	13	1.4	1.3	969	5.9	94.9
Psychiatry	902	4.9	600	4.4	66.5	69	4.2	7.6	70	7.6	7.8	739	4.5	81.9
Medical specialties	91	0.5	63	0.5	69.2	3	0.2	3.3	1	0.1	1.1	67	0.4	73.6
Dermatology	5	0.0	5	0.0	100.0	0	0.0	0.0	0	0.0	0.0	5	0.0	100.0
Neurology	59	0.3	35	0.3	59.3	1	0.1	1.7	1	0.1	1.7	37	0.2	62.7
Ophthalmology	27	0.1	23	0.2	85.2	2	0.1	7.4	0	0.0	0.0	25	0.2	92.6
General surgery	2,310	12.5	1,862	13.5	80.6	155	9.5	6.7	36	3.9	1.6	2,053	12.6	88.9
Surgical specialties	530	2.9	461	3.4	87.0	45	2.8	8.5	3	0.3	0.6	509	3.1	96.0
Neurosurgery	35	0.2	29	0.2	82.9	2	0.1	5.7	0	0.0	0.0	31	0.2	88.6
Othopedics	329	1.8	287	2.1	87.2	37	2.3	11.2	1	0.1	0.3	325	2.0	98.8
Otolaryngology	46	0.2	39	0.3	84.8	0	0.0	0.0	1	0.1	2.2	40	0.2	87.0
Urology	112	0.6	100	0.7	89.3	6	0.4	5.4	1	0.1	0.9	107	0.7	95.5
Plastic surgery	8	0.0	6	0.0	75.0	0	0.0	0.0	0	0.0	0.0	6	0.0	75.0
Support specialties	1,468	7.9	1,057	7.7	72.0	79	4.8	5.4	63	6.9	4.3	1,199	7.4	81.7
Anesthesiology	375	2.0	339	2.5	90.4	9	0.6	2.4	1	0.1	0.3	349	2.1	93.1
Emergency medicine	234	1.3	221	1.6	94.4	9	0.6	3.8	2	0.2	0.9	232	1.4	99.1
Pathology	468	2.5	190	1.4	40.6	35	2.1	7.5	56	6.1	12.0	281	1.7	60.0
Physical medicine	87	0.5	62	0.5	71.3	7	0.4	8.0	4	0.4	4.6	73	0.4	83.9
Preventive medicine	6	0.0	3	0.0	50.0	0	0.0	0.0	0	0.0	0.0	3	0.0	50.0
Diagnostic radiology	263	1.4	219	1.6	83.3	17	1.0	6.5	0	0.0	0.0	236	1.4	89.7
Therapeutic radiology	33	0.2	23	0.2	69.7	2	0.1	6.1	0	0.0	0.0	25	0.2	75.8
Nuclear medicine	2	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Transitional	1,206	6.5	972	7.1	80.6	61	3.7	5.1	53	5.8	4.4	1,086	6.7	90.0
Total	18,535	100.0	13,753	100.0	74.2	1,635	100.0	8.8	918	100.0	5.0	16,306	100.0	89.0

* Percent distributions of positions offered and filled among specialties (percentages may not add because of rounding).

† Percent of positions offered in specialty that were filled by applicants.

‡ See Table 1 footnote.

points. The most competitive programs were in emergency medicine, obstetrics/gynecology, orthopedic surgery, otolaryngology, urology, and diagnostic radiology. The participation of programs and positions in orthopedic surgery and urology was essentially unchanged. The low number of positions in neurological surgery and otolaryngology is attributable to the withdrawal of many programs in order to participate in non-NRMP matches. Only a few programs in nuclear medicine and plastic surgery again participated in the match. The distribution of matched U.S. seniors among types of programs decreased slightly in family practice and the support specialties, and the percentage of the class entering internal medicine and psychiatry increased slightly.

Advanced Programs for Students positions were again offered in the match this year. Twenty programs offered 44 positions in psychiatry and in the medical, surgical, and support specialties. The number of applications was small, and seven students were matched to them. Five students were also matched to programs they sought for the first postgraduate year.

For the second year, couples were not allowed to withdraw from the match to accept positions outside the match, and a paired-choice algorithm was used. This change resulted in the participation of 742 individuals as 371 couples; 90 percent of these U.S. students were successfully matched.

Several specialty matches for physician candidates were carried out by the NRMP in 1984. In the summer, 109 programs offered 248 positions for fellowships in respiratory disease; 217 physicians were matched to 88 percent of these positions. In the fall, 24 programs offered 46 positions in colon and rectal surgery, and 93 percent were filled. Late in the fall, 32 programs in emergency medicine offered 198 positions; 98 percent of them were filled with 194 physician applicants. In the first specialty match for dermatology last fall, there were 479 applicants for 202 positions; a total of 200 physicians were matched to fill 99 percent of the positions.

Data that describe the trends in numbers of positions offered and filled by U.S. seniors and other applicants during the past several years are included in one of the NRMP's annual directories (2).

JOHN S. GRAETTINGER, M.D., *executive vice president, National Resident Matching Program; associate dean for graduate medical education, Rush-Presbyterian-St. Luke's Medical Center; and professor of medicine, Rush Medical College, Chicago.*

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COMMUNICATIONS

Physician Specialist Growth into the 21st Century

David A. Kindig, M.D., Ph.D., and Nancy Cross Dunham

Physician manpower policies of the 1970s in the United States were primarily concerned with the geographic distribution and specialty composition of physician supply; current issues primarily focus on the overall number of physicians and the costs of medical practice and graduate medical education. The diffusion of physicians into rural areas has reduced the concern about geographic distribution (1), even though shortages in certain urban and rural areas are expected to last through the 1990s (2). The increase in the total physician supply has not had a similar positive effect on achieving a better balance between physicians in the primary care specialties and those in other specialties. However, there appears to be a sense among medical educators that the increase in the total physician supply and the previous increases in family practice and primary care residencies will also result in gradual diffusion of physicians into primary care and that a proper balance will be achieved.

Using supply assumptions of the Graduate Medical Education National Advisory Committee (3), the authors of the present paper have projected the growth in the physician supply to the point at which the physician-to-population ratio is expected to reach a maximum. It is estimated that this point will be reached between the years 2010 and 2020, when the supply of physicians will approximate 720,000, and the physician-to-population ratio will approach 300 per 100,000. In 1980, data of the American Medical Association Physician Masterfile indicated that 38.8 percent of the practicing physicians in this country were in the primary care specialties of family practice, internal medicine (excluding subspecialties), and pediatrics. Steinwachs and colleagues (4) have demonstrated that, while 57.5 percent of recent medical school graduates accepted entry level residency positions in primary care, only 31.8 percent eventually entered primary care practice. Figure 1 illustrates the impact of these percentage changes

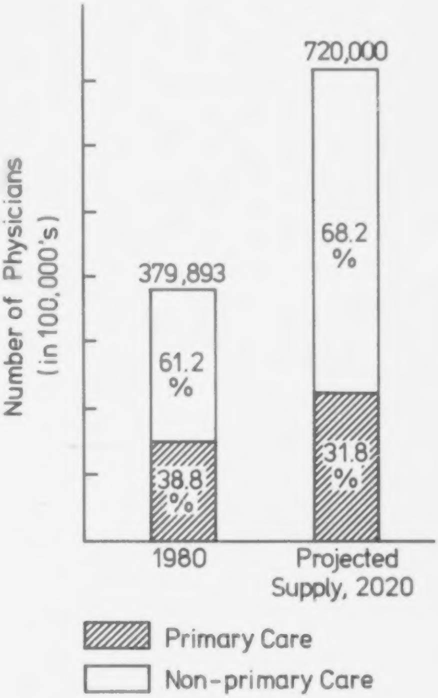

FIGURE 1

Number and specialty distribution of U.S. physicians in 1980 and authors' projections for 2020.

Dr. Kindig is vice chancellor for health sciences at the Center for Health Sciences and professor of preventive medicine at the Medical School, and Ms. Dunham is associate director of the Center for Health Policy and Program Evaluation, Center for Health Sciences, both at the University of Wisconsin, Madison.

For related editorial, see page 572.

on the total physician supply in 2020. Based on these assumptions, the absolute number of primary care physicians will increase by 81,000, or 55 percent, while the absolute number of physicians in other specialties will increase by 260,000, or 111 percent.

The specialty with the greatest opportunity for change is internal medicine. The data by Steinwachs (4) also show that, while 90 percent of physicians entering graduate medical education in family practice eventually enter primary care practice, only 38 percent starting graduate education in internal medicine enter practice in general internal medicine. The remainder, the data show, go into the medical subspecialties. This is identical with the 62 percent rate of subspecialization in internal medicine reported by Schleiter and Tarlov (5).

There is still debate over whether the 140,000 physician surplus projected by the Graduate Medical Education National Advisory Committee will be realized, given reductions in medical school class sizes, the aging of the population, the decline in physician productivity, and the increasing number of women in medicine (6). It is possible that the health care system may need the additional 81,000 primary care physicians that the authors estimate will be added by 2020. In light of the current regulatory and competitive approaches to cost containment, it is much more difficult to assume a need or demand for the additional 260,000 physicians in other specialties.

The public and private sectors should begin now to seek changes in graduate medical education and the physician reimbursement system so that some correction can be made while the total supply of physicians is still growing. Areas to consider are: state or federal grants to hospitals to convert residency training positions in other specialties to those in primary care, continued state and federal support for family practice and primary care residencies, changes in physician payment mechanisms through relative value scales or limited increases in payments to specialists to narrow the gap of compensation between primary care and specialist physicians, further reductions in the undergraduate pool, and restrictions on U.S. citizens studying medicine abroad. Failure to take some action will likely result in stringent and unwanted governmental regulatory approaches in the coming decades, such as assignment of number and types of residencies in a state or an individual hospital.

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DATAGRAM

Faculty Perceptions of Current Clinical Evaluation Systems

As part of the Association of American Medical Colleges (AAMC) Clinical Evaluation Program, an overview of the Self-Assessment of Clinical Evaluation Systems Project was made available to everyone at the AAMC Annual Meeting in November 1983. The purpose of the self-assessment project was to provide to medical schools materials that assist in examining and improving their systems of clinical evaluation. A survey instrument within the project overview requested information from the faculty members regarding (*a*) reactions to various characterizations of evaluation systems, (*b*) concerns about the evaluation of medical students, and (*c*) institutional and departmental reviews of clinical evaluation policies and procedures.

A total of 490 persons from 122 U.S. medical schools, 16 Canadian medical schools, and 69 affiliated teaching hospitals returned the survey instrument between November 1983 and June 1984. Not all respondents answered every question. Responses were received from persons in internal medicine, obstetrics-gynecology, pediatrics, psychiatry, surgery, family medicine, anesthesiology, emergency medicine, laboratory medicine, neurology, ophthalmology, otolaryngology, physical medicine and rehabilitation, radiology, and medical education.

Respondents were asked to react to six statements and indicate whether each statement accurately described the clinical evaluation systems at their respective institution. Results from 396 persons from 122 U.S. and 14 Canadian medical schools are presented in Table 1. However, calculation of percentages was based upon the total number of U.S. and Canadian medical schools, 127 and 16 respectively.

A majority of the respondents (71.0 percent) described their evaluation systems as uneven across departments and clinical training sites. There was general agreement (57.3 percent) that although their system works well for evaluating most students, it does not respond adequately to all evaluation situations, such as the marginal or failing student. Respondents from a little over a third of the U.S. medical schools and nearly half of the Cana-

TABLE 1

Endorsements of Six Statements Describing Clinical Evaluation Systems by 396 U.S. and Canadian Medical School Respondents, 1983–1984

Statement on Systems	Respondents		Medical Schools Represented by Respondents			
			U.S. ($n = 127$)		Canadian ($n = 16$)	
	No.	Percent	No.	Percent	No.	Percent
Is uneven from department to department, site to site	281	71.0	114	89.8	13	81.3
Works well but not designed to handle some specific situations, which are solved ad hoc	227	57.3	98	77.2	11	68.8
Works quite well for majority of students and faculty members	196	49.5	93	73.2	8	50.0
Is "nominal"–works quite differently in practice than in theory	60	15.2	48	37.8	5	31.3
Requires a major overhaul	78	19.7	46	36.2	7	43.8
Unique and innovative	34	8.6	27	21.3	5	31.3

TABLE 2

Concerns Raised About the Clinical Evaluation of Medical Students by 428 U.S. Medical School, Canadian School, and Teaching Hospital Respondents, 1983–84

Concern	No. of Times Listed by Respondents			
		Institutions Represented by Respondents		
	Respondents	U.S. Medical Schools ($n = 122$)	Canadian Medical Schools ($n = 14$)	Teaching Hospitals ($n = 43$)
Lack of reliability of evaluations/lack of uniform evaluations between training sites, evaluators, and departments	68	44	4	5
Lack of objectivity of evaluations	66	43	3	9
Difficulty evaluating one or more specific clinical abilities	57	39	4	3
Deciding on uniform criteria/acceptable standards of performance	53	36	5	4
Difficulty evaluating noncognitive areas	36	27	4	2
Lack of validity/accuracy of evaluations	35	22	2	7
Inadequate time for faculty to get to know students well enough to collect adequate data for evaluations	34	22	2	6
Training/motivating evaluators	34	21	4	4
Lack of timely, meaningful feedback to students	31	23	2	3
Making proper use of evaluations	23	17	2	3
Early identification of the failing student	23	18	2	0
Defining objectives of training program for evaluation	19	15	1	2
Lack of direct observation of clinical performance	18	13	1	3
Deciding on content of evaluation	17	15	0	1
Difficulty evaluating clinical competence/ensuring minimal competence	17	12	1	2
Proper handling of students at the extremes	15	13	1	1
Inadequate methods of evaluation	14	10	2	2
Lack of correlation between clerkship and future clinical performances/lack of predictive power of evaluation	13	12	0	1
Discriminating between students in the average range	12	9	0	3
Documenting unsatisfactory performance/reluctance to give a poor evaluation	10	7	0	1
Overemphasis on cognitive knowledge	7	7	0	0
Lack of integration of evaluation information/integration of knowledge, skills, and attitudes to produce comprehensive evaluation	7	6	0	1
Evaluating long-term student progress over the course of the training program	5	2	1	2
Difficulty evaluating cognitive knowledge	5	4	0	1
Difficulty evaluating cognitive skills	3	2	0	1
Failure of faculty to conduct evaluations	1	0	0	1
Need for subjective/objective balance in evaluations	1	1	0	0
Determining relative weight of each of the various areas being evaluated	1	1	0	0

dian schools agreed that their systems required a major overhaul. By contrast, persons from a fifth of the U.S. schools and close to a third of the Canadian schools indicated they had rather unique and innovative evaluation systems in place.

The respondents were also asked to write in the single issue that they considered to be the most pressing in regard to the evaluation of medical students during their clinical education. The data from 428 persons from 122 U.S. medical schools, 14 Canadian medical schools, and 43 teaching hospitals are displayed in Table 2. The items are listed in the table according to the frequency that they were mentioned. The most frequently voiced concerns were issues relating to quality of assessment (reliability, objectivity, uniformity, validity, and feasibility of evaluating certain content areas). Another major category was that of concern with the process itself, that is, the training and involvement of evaluators, proper feedback to students, definition of objectives, and effective use of evaluations.

A total of 348 persons provided usable responses to the question of whether there had been an institutional and/or departmental review of the clinical evaluation policies and procedures during the past five years (1979–1983). Their responses, summarized by medical school and clinical department, are presented in Table 3. A total of 130 persons from 76 medical schools and 198 persons from 185 clinical departments stated that reviews of their systems of clinical evaluation had been conducted during this period.

A breakdown by date and level of review (by the medical school or clinical department) shows that a majority of the reviews were conducted in 1983 or were in progress at the time of the completion of the questionnaire. At the medical school level, 29 reviews were reported in 1983 compared with 21 that took place during the previous four years combined. The distribution of reviews which took place at the departmental level during the same five years displays a similar pattern: in 1983, 52 departments reviewed their evaluation systems, whereas during the previous four years, a total of 59 departments conducted such reviews. However, respondents representing 49 clinical departments and 10 medical schools indicated no deliberate review had been undertaken at all during this time, and respondents from six clinical departments indicated they did not know whether any review had been conducted.

Actions taken as a result of the reviews that had occurred at either the institutional or departmental level are displayed in Table 4. Actions or consequences fell into three groups. The first included changes made in the formal aspects of the evaluation system: procedures, instruments, program content, grading system, documentation, criteria, objectives, and evaluation content. The second category contained personnel-related actions: working with the faculty to increase awareness and feedback, forming committees to address evaluation problems, and increasing feedback to students. The third group contained general statements regarding general outcomes of the review: problems identified but no improvements made, evaluation system deemed adequate but no changes made, evaluation system revised until faculty satisfied, and major deficiencies discovered and corrected.

The actions most often cited by the re-

TABLE 3

Status of Reviews of Clinical Evaluation Policies and Procedures at 86 Medical Schools and 240 Clinical Departments as Reported by 348 Respondents, 1983–84

Status of Review	Medical School	Clinical Department
Performed in 1983	29	52
Performed in 1982	11	29
Performed in 1979, 1980, or 1981	10	30
In progress	19	39
Conducted periodically	6	25
Year unknown	1	10
Unaware if conducted	0	6
None	10	49

TABLE 4

Actions Taken or Consequences Cited as Reported by Respondents at Medical Schools or Clinical Departments Following Review of Evaluation Policies and Procedures, 1983–84*

Review Outcomes	No. of Times Reported
Actions addressing formal aspects of system	
Changed procedures/methods for conducting evaluations	61
Changed/revised evaluation instruments	61
Attempted to standardize evaluations	24
Changed curriculum/program	19
Changed/revised grading system	18
Made unspecified minor changes in evaluation system	17
Changed/improved documentation of student performance	15
Changed/defined criteria used for evaluations	14
Changed/defined objectives of training program	7
Changed content of evaluation	5
Personnel-related actions	
Increased faculty awareness/understanding of evaluation system issues, problems, and procedures	16
Increased feedback to students	14
Formed committee to address issues of evaluation	11
Increased feedback to faculty	5
General outcomes	
Documented deficiencies but no changes or improvements made	36
Evaluation system found to be adequate/no changes made	3
Evaluation system revised until faculty satisfied	1
Major deficiencies discovered/corrected	1

* Number of respondents = 384. Respondents were free to cite more than one action. The responses of seven persons could not be classified into the three groups and thus are omitted from the table.

spondents fell into the first group, which dealt with changes made in the formal aspects of the clinical evaluation system. For example, changes in procedures and in evaluation instruments were each mentioned 61 times.

Actions in the personnel-related category were fewest in number. The most popular item was mentioned only 16 times. Since persons have to be committed to the evaluation process for the formal aspects of the system to function smoothly and efficiently, more attention to the personnel-related actions could be expected.

The most frequently related general outcome was that problems had been identified but no subsequent action was taken. Thirty-six respondents indicated that this was the case.

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between academic performance and specialty selection as hypothesized by the present authors. A total of 104 students were asked to rate 18 factors on a 5-point scale from most to least influential according to how each affected their choice of specialty. Results from the 71 respondents (68 percent response rate) were rank-ordered. A student's perception that his strength was in his chosen discipline ranked first in this listing; that is, it was most influential. The definition of strength was left to the individual respondent. A strong academic performance in his selected area of specialization ranked only 11th. Other factors which were ranked as highly influential included intellectual challenges found in the discipline (second), educational experiences during the clinical science years of medical school (third), anticipated work conditions (fourth), and anticipated practice opportunities (fifth). The least influential factors were financial rewards of the discipline and perceptions of the discipline's status among physicians (tied for 14th place), length of postgraduate training period (16th), medical school faculty adviser (17th), and family members (18th).

Despite other researchers' findings to the contrary (2), the study reported here did not find a positive relationship between medical students' choice of postgraduate training and their academic performance as indicated by the NBME Part II subtest scores. Regardless of specialty choice, UMDNJ-RMS students as a group performed on the psychiatry subtest better than or as well as the other specialty subtests. With the exception of students entering the field of psychiatry, the students did not perform better on the NBME subtest in the area of their chosen specialty. Subjective data, that is, students' reports of factors that influenced their choice of a specialty, also failed to provide evidence of a relationship between that choice and their performance on the NBME subtests. In conclusion, there is a complex interplay of factors that result ultimately in a student's decision to pursue a particular specialty; academic performance does not appear to be a central force.

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Academic Clinicians Without Residency Training Programs

Samuel H. Greenblatt, M.D., and Philip L. Gildenberg, M.D., Ph.D.

In the late 1970s, the Subcommittee on Undergraduate Education of the Joint Committee on Education of the American Association of Neurological Surgeons and the Congress of Neurological Surgeons began a survey of "Neurosurgical Faculty Participation in Undergraduate Medical Education in American Medical Schools." The results of that survey (1) were ultimately reported in two sections, because clear differences emerged between the results for neurosurgical faculties with residencies and those without residencies. In general, the group with residencies had less involvement in medical school curricula, though this was not universally true. In the course of con-

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ducting that survey, information was gathered concerning manpower and activities of neurosurgical faculty members in schools without closely affiliated residencies, but the data were incomplete. Accordingly, the chairman of the subcommittee authorized a repeat survey of all medical schools and satellite campuses for the clinical years without closely affiliated neurosurgical residencies.

A report, "Status of Neurosurgery in American and Canadian Medical Schools Without Neurosurgical Residencies" (2), has been published recently. According to the report, 38 accredited U.S. medical schools and three Canadian medical schools did not have closely affiliated neurosurgical residencies. This represented 30 percent of 126 U.S. medical schools and 19 percent of 16 Canadian schools. Two of the U.S. schools were two-year institutions, whose students went on to receive their M.D. degrees at other medical schools. In addition, there were 10 satellite campuses, all in the United States, where medical students received their clinical training and obtained their M.D. degrees at locations that did not have affiliated neurosurgical residencies.

In the more recent neurosurgical survey (2), responses were obtained from all 51 medical schools and satellite campuses without affiliated neurosurgical residencies. One two-year school (Morehouse School of Medicine) had no faculty neurosurgeons. Among the remaining 50 institutions, there were 57 full-time neurosurgeons at 27 schools and satellite campuses. Another 27 neurosurgeons were partially salaried at 12 schools, which included some of those schools that also had full-time neurosurgeons. Thus, 33 schools and satellite campuses provided some institutional support for 84 faculty neurosurgeons. In addition, a total of 187 community neurosurgeons were affiliated in voluntary status with 36 schools and satellite campuses. Therefore, there was a total of 271 neurosurgeons at 40 medical schools and 10 satellite campuses without closely affiliated neurosurgical residencies, but 17 of these 50 institutions depended entirely on voluntary neurosurgical faculty members.

Other Clinicians

The number of other academic clinicians working at schools without closely affiliated residencies in their specialties has not been documented. However, the data in Table 1 offer an indication. It shows how many of the 124 U.S. M.D.-degree-granting medical schools as of 1983–84 did not have closely affiliated residency training programs in 17 different specialties. To compile the data, the authors compared a list of the hospitals affiliated with accredited and provisionally accredited medical schools in the United States (3) with published lists of accredited residency training programs (4, 5) for 1983–1984. The data were occasionally supplemented by information obtained from colleagues of the authors and by telephone conversations with officials at a few schools. The 17 specialties represent those that are certified by 16 different specialty boards (neurology and psychiatry have the same board). Subspecialty programs (such as cardiology and pediatric neurology), more unusual specialties (for example, aerospace medicine and nuclear medicine), and

TABLE 1

Number of 124 U.S. Medical Schools Without Closely Affiliated Residency Training Programs in 17 Specialties, 1983–84

Specialty	No. of Schools
Anesthesiology	24
Dermatology	41
Family practice	22
Internal medicine	0
Neurological surgery	36
Neurology	21
Obstetrics and gynecology	4
Ophthalmology	18
Orthopedic surgery	8
Otolaryngology	33
Pathology	8
Pediatrics	2
Physical medicine and rehabilitation	66
Psychiatry	5
Radiology-diagnostic	13
Surgery	1
Urology	20

Sources: References 3–5.

programs requiring extensive prior training in other fields (for example, plastic surgery and thoracic surgery) were not included.

According to Table 1, most of the primary care specialties (internal medicine, obstetrics and gynecology, pediatrics, and surgery) were well represented by residencies affiliated with almost all medical schools. The notable exception was family practice: there were no closely affiliated residencies in this specialty at 22 schools. Among the remaining 12 specialties in Table 1, three were unrepresented at fewer than 10 schools (orthopedic surgery, pathology, and psychiatry). Thus, in addition to family practice, more than 10 schools did not have closely affiliated residency training programs in anesthesiology, dermatology, neurological surgery, neurology, ophthalmology, otolaryngology, physical medicine and rehabilitation, diagnosis radiology, and urology. The data in Table 1 did not permit a calculation of the actual number of individual clinicians who worked at schools without closely affiliated residencies in their specialties, but they did imply that the detailed information about faculty neurosurgeons without closely affiliated residencies may be representative of specialists in other fields.

Conclusions

It is apparent that there are large numbers of academic clinicians who are not affiliated with residency training programs in their specialties. Moreover, their numbers are likely to increase as the result of governmental and societal pressures to contain or reduce the numbers of physicians in many specialties. Even if fewer faculty clinicians are needed to staff residency programs, medical schools without closely affiliated residencies in some fields still need to have those specialties represented on their faculties to teach medical students and residents in other specialties. For any clinician-teacher, with or without a closely affiliated residency program, it is important to be in touch with educational developments in his specialty at the national level. In neurosurgery, the surveys previously described (1, 2) showed that inadequate integration into the national cadre of neurosurgical educators was a major problem for academic neurosurgeons who were not affiliated with neurosurgical residency programs. Therefore, it is reasonable to presume that academic clinicians without residencies in other specialties will have similar difficulties.

In the neurosurgical community, leadership in educational efforts at all levels—undergraduate, residency, and continuing education—has devolved upon national groups that consist largely of residency program directors. Since there was no list of the neurosurgical chiefs at medical schools without closely affiliated neurosurgical residencies, the neurosurgical faculties at those schools were relatively and inadvertently excluded from the activities of the national groups. When this problem was realized and a list of academic neurosurgical chiefs without residencies was compiled (2), the American Board of Neurological Surgery (ABNS) in 1984 "voted to develop a dialogue with chiefs of neurosurgical programs at medical schools having no neurosurgical residency training programs" (6). These schools have already been included in an ABNS survey of critical care issues, and the board plans to share information on all of its educational activities and concerns with all neurosurgical chiefs, including those without residency training programs. This action will be beneficial not only to the faculty members who receive the information and assistance but also to the medical students and nonneurosurgical residents whom they teach.

On the basis of the experience reported here regarding neurosurgeons, educational leaders in other specialties may wish to consider similar efforts in their own fields.

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Studying Reports of Women Medical Students On Their Eating Disorders

Paul Hamburg, M.D., and David B. Herzog, M.D.

The recent literature has described the stressful nature of graduate education in general and of medical school in particular (1, 2). Gaensbauer and Mizner (1) emphasized the succession of developmental tasks facing students in each year of medical school, beginning with the complexity and quantity of learning in the first year and continuing with the stress of assuming patient care responsibility in the clinical years. They discussed the challenges of fatigue in medical training, balancing personal needs with new responsibilities, and the difficulty of incorporating marital or personal crises into the framework of graduate medical education.

Studies have focused particular concern upon possible additional stresses experienced by women in graduate professional programs, including the impact of a competitive career path upon their identities as women (3–5). Gaensbauer and Mizner (1) described several sources of these stresses, including the postponement of having children, the conflict between having to be assertive and older definitions of "feminine" behavior as passive and giving, the struggle between a desire to nurture and professional detachment, and the isolation of being a single woman within the medical school milieu. Edwards and Zimet (2) found more intense concerns about loneliness, feeling out of place, and being unable to reach expected goals among their sample of women in medical school than among male counterparts. Hoferek and Sarnowski (6) reported more feelings of isolation, a difficulty in making friends, and less sense of support from the surrounding community among their sample of women medical students than among the male students.

Methods

As part of a pilot study concerning eating disorders, Dr. David B. Herzog and colleagues at the Massachusetts General Hospital, Boston, in 1983 asked a group of 212 female students at a major eastern medical school to fill out a questionnaire concerning eating behavior and attitudes. That study was a result of requests from several female students for assistance in setting up a support group for

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The study reported here was supported in part by grants from the GenRad Foundation, Concord, Massachusetts, and the Milton Fund.

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DATAGRAM

Net Patient Revenue at University-Owned Teaching Hospitals, 1982

During the two past years, the Department of Teaching Hospitals of the Association of American Medical Colleges (AAMC) conducted its 13th annual survey of financial and general operating data for the university-owned members of the Council of Teaching Hospitals (COTH). A questionnaire was sent to all 66 hospitals in July 1983. Follow-up requests for participation were made in September and November. By January 1984 all 66 had submitted responses.

The questionnaire generally requested data from the hospitals' fiscal 1982 Medicare cost reports. The questions were essentially the same as those asked in the surveys for the previous two years.

State Appropriations

Nearly two-thirds of the hospitals (43 of the 66) reported they received some state appropriations. Many of the state appropriations were specifically earmarked to support clinical teaching and other educational activities or to provide care for indigent or partially funded patients. However, these labels may be somewhat misleading, because it is not possible to distinguish strictly between patient care and educational costs in a teaching hospital. Moreover, some states contracted with the university-owned hospitals to provide specific patient care services (for example, psychiatric care), but the state funding for these services was not usually called an "appropriation."

The percentage of total operating revenues derived from state appropriations was used as an indicator of how dependent the hospitals were on the appropriations. Table 1 shows the variation in these percentages among hospitals responding to the fiscal 1975 through fiscal 1982 surveys that reported they received state appropriations. In all years, more than half of the respondents received less than 20 percent of their operating revenues from state appropriations, and more than three-fourths received less than 30 percent. In fiscal 1982, only six hospitals (14 percent) received more than 30 percent of their total operating revenues from state appropriations.

A total of $628 million was appropriated in fiscal 1982 by the states to the 43 hospitals, which equates to an average appropriation of approximately $14.6 million. This was $1.4 million (9.5 percent) higher than the average appropriation received by those hospitals in fiscal 1981.

TABLE 1

Percentage of State-Funded Teaching Hospitals by Proportion of Total Operating Revenue Received from State Appropriations, 1975 Through 1982

Fiscal Year	Percentage Total Operating Revenue from State Appropriations					
	0–10 Percent	11–20 Percent	21–30 Percent	31–40 Percent	41–50 Percent	51–100 Percent
1982 ($n = 43$)	35	28	23	5	2	7
1981 ($n = 43$)	30	35	26	2	5	2
1980 ($n = 44$)	36	27	18	9	9	0
1979 ($n = 43$)	37	21	26	5	9	2
1978 ($n = 41$)	29	32	27	5	7	0
1977 ($n = 41$)	36	25	17	15	5	2
1976 ($n = 40$)	37	23	18	15	7	0
1975 ($n = 38$)	21	29	24	10	13	3

TABLE 2

Sources of Net Patient Revenue for University-Owned Teaching Hospitals That Received State Appropriations Earmarked for Patient Care, Fiscal Years 1981 and 1982

(In thousands of dollars)

Revenue Source	Fiscal 1982 ($n = 18$)		Fiscal 1981 ($n = 18$)	
	Amount	Percent	Amount	Percent
State appropriations*	277,331	19.0	237,943	19.8
Blue Cross	170,955	11.7	142,934	11.9
Commercial insurance	254,281	17.4	174,458	14.5
Self-pay	124,078	8.5	79,615	6.6
Medicare	332,656	22.8	280,551	23.3
Medicaid	178,795	12.2	184,496	15.3
County appropriations	20,295	1.4	18,758	1.6
City appropriations	0	0	0	0
Additional welfare payments	16,281	1.1	22,168	1.8
Workman's compensation	7,661	0.5	6,163	0.5
Other	78,927	5.4	56,253	4.7
Total	1,461,261	100.0	1,203,338	100.0

* May include funds for nonpatient care uses.

Patient Revenue by Source

Twenty-nine of the fiscal 1982 survey respondents reported net patient revenue by source. Twenty-four of these hospitals reported net patient revenue by source in the previous year's survey. In order to eliminate possible bias, tables 2 through 4 compare data only for those institutions that reported net patient revenue in both years for the variables being examined.

Eighteen hospitals reporting net patient revenues received state appropriations in both fiscal 1981 and 1982 (Table 2). In both years, state appropriations accounted for nearly one-fifth of the revenues, making it the second largest source of revenues. Medicare was the largest, providing 22.8 percent of the net patient revenues in fiscal 1982. Also in fiscal 1982, commercial insurance carriers were the third largest source of net income (17.4 percent), and Medicaid was fourth (12.2 percent). In fiscal 1981, Medicaid's payments to these hospitals had been larger than those of the commercial insurers.

The average net patient revenues for the 18 hospitals that received state appropriations in fiscal 1982 was $81.2 million. This was 21 percent higher than the average revenues at those hospitals in fiscal 1981.

Table 3 shows the aggregate data for the six hospitals that were able to report net revenues for fiscal 1982 and 1981 but did not receive state appropriations. Medicare was also the largest payer for this group of hospitals, providing nearly 30 percent of the net patient revenues. Blue Cross was the second largest payer, providing 22 percent of the net revenues. The commercial insurance companies and Medicaid were the next largest, with each providing approximately 15 percent of the revenues.

The average net patient revenues for these six hospitals was $88 million in fiscal 1982, an increase of 17.6 percent over fiscal 1981.

Sources of Revenue by Type of Care

Twenty-three hospitals were able to report the sources of their net patient revenue separately for inpatient and outpatient care for fiscal 1981 and 1982 (Table 4). For the inpatient sector, Medicare was the leading payer in both years, providing more than 27 percent of the net revenues. In fiscal 1982, commercial insurance companies were the second largest

TABLE 3

Sources of Net Patient Revenue for University-Owned Teaching Hospitals That Did Not Receive State Appropriations Earmarked for Patient Care, Fiscal Years 1981 and 1982

(In thousands of dollars)

Revenue Source	Fiscal 1982 ($n = 6$)		Fiscal 1981 ($n = 6$)	
	Amount	Percent	Amount	Percent
Blue Cross	117,303	22.2	99,604	22.2
Commercial insurance	83,322	15.8	64,772	14.4
Self-pay	26,666	5.0	26,474	5.9
Medicare	154,267	29.2	126,786	28.2
Medicaid	77,523	14.7	70,693	15.7
County appropriations	462	0.1	587	0.1
City appropriations	0	0	0	0
Additional welfare payments	0	0	0	0
Workman's compensation	1,592	0.3	1,493	0.3
Other	67,105	12.7	58,911	13.1
Total	528,240	100.0	449,321	100.0

TABLE 4

Sources of Net Patient Revenue by Type of Care in University-Owned Teaching Hospitals, Fiscal Years 1981 and 1982*

(In thousands of dollars)

Revenue Source	Fiscal 1982 ($n = 23$)				Fiscal 1981 ($n = 23$)			
	Outpatient		Inpatient		Outpatient		Inpatient	
	Amount	Percent	Amount	Percent	Amount	Percent	Amount	Percent
Blue Cross	30,694	13.1	257,564	16.5	28,009	13.6	214,528	16.1
Commercial insurance	33,798	14.4	303,804	19.5	27,315	13.3	211,915	15.9
Self-pay	43,608	18.6	100,744	6.5	35,819	17.4	65,777	5.0
Medicare	47,551	20.3	429,311	27.5	38,901	18.9	361,382	27.2
Medicaid	29,724	12.7	218,748	14.0	31,330	15.3	217,062	16.3
State appropriations†	17,732	7.6	88,429	5.7	19,520	9.6	119,365	9.0
County appropriations	5,153	2.2	15,604	1.0	5,632	2.7	13,714	1.0
City appropriations	0	0	0	0	0	0	0	0
Additional welfare payments	2,702	1.1	13,579	0.9	2,880	1.4	19,288	1.5
Workman's compensation	1,767	0.7	7,486	0.5	758	0.4	6,898	0.5
Other	21,926	9.3	124,106	7.9	15,273	7.4	99,891	7.5
Total	234,656	100.0	1,559,374	100.0	205,437	100.0	1,329,821	100.0

* Data reported only for those hospitals able to separate net patient revenue into inpatient and outpatient categories.

† Includes only funds reported as net patient revenue.

source of net inpatient revenue, (19.5 percent) followed by Blue Cross (16.5 percent) and Medicaid (14.0 percent). In fiscal 1981, Medicaid was the second largest source (16.3 percent); Blue Cross was the third (16.1 percent), and the commercial insurers were fourth (15.9 percent).

The average total net inpatient revenues rose from $57.8 million in fiscal 1981 to $67.8 million in fiscal 1982, an increase of 17.3 percent.

For the outpatient service, Medicare again was the single largest source of net revenue, providing approximately one-fifth of the net revenues in fiscal 1982. The self-pay patients accounted for the next largest portion of the revenues followed in fiscal 1982 by commercial insurance companies, Blue Cross, and Medicaid.

The total average outpatient net revenues for these 23 hospitals in fiscal 1982 was $10.2 million. This is 14.2 percent more than the average net outpatient revenues in fiscal 1981.

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Impact of Medical School Class Ranking Systems On Applicants' Ratings for Residency Positions

Laura T. Gutman, M.D., and Seymour Grufferman, M.D., Dr.P.H.

Abstract—The systems used by the medical schools for evaluation of 106 applicants for 1984–85 pediatric level 1 (PL-1) residency positions at the Duke University Medical Center were studied by the authors to determine the possible relationship between contents of the applications and the rankings of these applicants for the National Resident Matching Program (NRMP). In the 56 U.S. medical schools studied, the grading systems of 24 medical schools used three passing grades (usually A, B, C), 14 used two passing grades (usually honors and pass), six used one passing grade (pass) and seven used a mixed system or number grades. The grading systems of five schools could not be discerned. Ten schools provided the class distribution of the awarded grades, and 23 identified the relative class standing of the applicant. Twenty-seven schools disclosed the position of the applicant in the class through grade distribution data or class standing; the 29 other schools did not make such information known. Students whose schools had identified their class positions achieved higher rankings from the residency selection committee than did students from schools which did not, in spite of the fact that schools which did not disclose the student's comparative positions were categorized as being more "distinguished."

The National Resident Matching Program (NRMP) requires each participating residency training program to rank applicants to its program in order of the program's preference. During the application process, extensive efforts are made at each institution by house staff selection evaluation committees to obtain a full understanding of the strengths, weaknesses, and other characteristics of each applicant. The final ranking of applicants for the Duke University Medical Center pediatric residency program is based in part on the dean's letter, grade and transcript information, letters of recommendation, interviews, and the results of standardized tests, such as those of the National Board of Medical Examiners (NBME). The contents of these materials, which may enable the residency program to know the comparative level of achievement among applying students, vary considerably from school to school. The authors of the present paper studied the grading systems used by the schools of the applicants for the 13 pediatric level 1 (PL-1) residency positions in 1984–85 and determined whether or not each school had provided information on the relative class standing of its students. The effect of a school's

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For related editorial, see page 735.

giving and not giving information on class standing on the ranking of applicants by the residency selection committee was then examined.

Methods

There were 385 applications for the 1984–85 PL-1 positions at the Duke University Medical Center. Of these, 106, all from U.S. medical schools, were completed fully and ranked for the NRMP. Thirty-one additional applications from U.S. medical schools were completed fully but not ranked for the NRMP for a variety of reasons; 96 from U.S. medical schools were incomplete; and 152 applications were from graduates of foreign medical schools. The study reported here was based on the 106 fully completed applications submitted by graduates of 56 U.S. medical schools for the 1984–85 PL-1 positions that were ranked for the NRMP. This study was neither planned nor done until after the rank order listing to the NRMP had been submitted.

Completed applications contained a transcript, a dean's letter, two or more letters of recommendation from faculty members of the applicant's medical school, an autobiographical statement, an application form, and the results of interviews with Duke University Medical Center faculty members.

Prior to the study, the applications had been ranked by members of the Duke University pediatric residency selection committee, on which seven pediatric faculty members and two PL-1, PL-2, and PL-3 residents served. A summary of each application had been presented to the entire committee, which had assigned a numerical score to the application. The numerical scores ranged from 100 (highest) to 500 (unacceptable).

For the present study, the transcripts were categorized by the authors according to the presence of one, two, or three passing grades by which the levels of achievement of each student in each course could be designated and whether or not information concerning the proportion of the class which had received each grade in each course was provided. The transcript was also reviewed for the presence or absence of a specific code or listing by which the reader could determine (*a*) the grading system used by the school, (*b*) the identification of the meanings of the grading symbols, (*c*) whether the assigned grading symbols conformed to the code, and (*d*) the length of descriptions of the grading system.

The transcript and the dean's letter were studied for information concerning the relative position of the student within his class by specific class rank, class percentile, or class fraction.

The 56 U.S. medical schools from which the 106 applicants graduated were divided into those which provided "comparative" information concerning the student's accomplishments and those which did not. The criteria for characterizing a school as "comparative" stipulated that the school had provided at least one of the following: (*a*) a grading system with at least two passing grades plus indication of the class distribution of those grades; (*b*) information concerning class ranking by specific class rank, class percentile, or class fraction; or (*c*) a key to the summary statement of the dean's letter.

The differences in the selection committee's rankings of applicants from comparative schools and those from noncomparative schools were assessed by the authors in two ways. First, the scores given to the applicants by the committee were categorized into four strata, 100 to 149, 150 to 199, 200 to 249, and 250 or greater. The differences were evaluated in these strata by a chi-square test for linear trend (1). Since the rankings did not appear to be distributed normally, a Mann-Whitney U test was applied to test the differences between students from the two groups of schools. Since many schools had more than one applicant, a mean score for all students from each school was computed; this precluded over-weighting a particular school.

The possibility that the results might be confounded by underlying differences in the academic strength of the schools in the comparative and noncomparative groups was examined. The schools were ranked according to the ratings done by Gourman (2). This system ranked all medical schools in terms of their academic strength and categorized them into "distinguished," "strong," "good", and "acceptable-plus" groups. The schools were ranked from 1 (strongest) through 124 (weakest). In the present study, the Gourman rankings for comparative schools were compared with those of noncomparative schools and analyzed by a Mann-Whitney U test.

Results

The 106 applicants from U.S. schools who were ranked for the NRMP formed the applicant pool on which this study was based. The study applicants graduated from 56 schools located in 28 states. Thirty-two schools had only one applicant, while two or more applicants were from the other 24 schools. In all but five instances, the type of information provided by the transcript was similar for all applicants from the same school. Thirty-nine of the 56 schools provided transcripts that described the grades that could be awarded and contained a transcript key that included all the grading symbols that appeared on the transcript. Ten schools provided transcripts which did not have a key and which used grading symbols whose meaning was uncertain. Seven additional schools provided a transcript key, but the key failed to include all the grading symbols which had been awarded. Of the 56 schools, the authors were in doubt about a major aspect of the grading systems used at five schools. Two schools' transcripts showed "S" and "P" grades, without defining either, in which case S could be interpreted to mean either "satisfactory" or "superior." One school's transcript had S grades, some of which were accompanied by an asterisk, the meaning of which was not defined. One school's transcript contained grades of A, B, C, and P without stating whether or not an "H" (honors) grade was included in its grading system. Finally, one school's transcript contained a key which defined P, but S grades were awarded.

In addition to these problems in interpretation of the transcripts, five schools provided transcript keys that were excessively burdensome to read. These contained detailed descriptions of grading systems of other schools (such as agriculture and nursing) that differed from those of the medical school, descriptions that were one or more pages in length, or grading systems that had changed repeatedly from one year to the next.

Of the 56 schools, 51 provided transcripts from which the grading system could be understood with reasonable certainty (Table 1). For these schools, 24 gave three passing grades (usually high honors, honors, pass; A, B, C; or 1, 2, 3), 14 gave two passing grades (usually Honors, Pass), six gave one passing grade, four gave a mix of two passing grades in some years and one passing grade in others, and three gave numerical grades (such as 78 or 98).

Twenty-seven of the 56 schools provided "comparative" information concerning the students' ranking within the

TABLE 1

The Grading Systems of 56 U.S. Medical Schools as Determined by Evaluating the Transcripts of 106 Applicants to the Duke University Medical Center Pediatric Residency Program, 1984–85

Grading System	No. of Schools		
	Distribution of Grades Given	Distribution of Grades Not Given	Total
Three passing grades*	5	19	24
Two passing grades†	4	10	14
Numerical grades	1	2	3
One passing grade	—	6	6
Mixture of one passing grade and two passing grades‡	—	4	4
Uncertain§	—	5	5
Total	10	46	56

* Usually high honors, honors, pass; A, B, C; or 1, 2, 3.

† Usually honors and pass.

‡ A mixture of two passing grades in some years and one passing grade in others.

§ Due to ambiguous information.

class. Ten schools had a grading system which included data on the proportion of students who were awarded each grade for each course for that year or as an average of several years (Table 1). An example of a particularly effective format by which grade distribution was presented by three schools is shown in Table 2.

Table 3 describes the forms of class distribution represented by these 10 schools. In six cases the class distribution of grades was provided for each course. There were three schools in which the dean's letter provided data concerning the average percent of honors grades given for the basic science courses, required clinical rotations, and electives. One school provided data concerning the percent of honors grades given as an average of the previous five years.

Specific information concerning the comparative position of the applicant within his class was provided by 23 schools. The specific class rank of the applicant (for example "13 of 118") was provided by seven schools (Table 3). The dean's letters from five additional schools provided information concerning the applicants' percentile rank in the class (for example, "top 30 percent of class"). The dean's letters from eight schools provided information concerning class standing with regard to class quartile, class third, or class half. One final method, used by four schools to convey a student's class standing, was through a key to the summary statement at the end of the dean's letter. One of these four schools stated on an attachment to the dean's letter that final categorization of the students had been distributed so that "15.3% were Outstanding, 30.5% Very good, 30.5% Good,

TABLE 2

Sample of Transcript Format by Which a Student's Grades for Each Course and Distribution of Grades for Entire Class Can Be Presented Effectively by Medical Schools

Course	Student's Grade*	Class Distribution of Grades*			
		HH	H	P	F
Anatomy	H	10%	25%	60%	5%
Medicine I	HH	15%	30%	50%	5%

* H = honors; HH = high honors; P = pass; F = fail.

TABLE 3

Format of Information on Class Position Given on Students' Applications to the Duke University Medical Center Pediatric Residency Program by 27 Medical Schools Classified as Providing 'Comparative' Data, 1984–85

Information Provided	No. of Schools
Class distribution of grades	
Each course	6
Average of honors grades for basic sciences, required clinical rotations, and electives	3
Average of honors grades for previous five years	1
Subtotal	10
Class position of student	
Rank	7
Percentile	5
Quartile	2
Third	4
Half	2
Subtotal	20
Key provided to dean's letter summary statement	4

and 23.6% Satisfactory." One of the four schools providing a key to the dean's letter summary statement also provided other data concerning class ranking and thus was included in two categories. In summary, therefore, 23 schools provided an indication of the class position of the student through class rank, class percentile, class fraction, or a key to the dean's letter summary statement.

Two or more applications, totaling 72, were received from each of 24 schools and ranked for the NRMP. For 67 of these applicants, the type of provided information concerning grading system, class rank, class fraction, and key to the summary statement of the dean's letter was identical in all applications from the same school. Four schools provided comparative information concerning one applicant and noncomparative data for at least one other applicant.

Twenty-nine schools did not provide comparative information concerning the applicant's class standing.

Table 4 shows the selection committee's mean scores of applicants who were ranked for the NRMP from each medical school classified according to whether comparative or noncomparative information had been provided. The scores for students from comparative schools were significantly higher than were those from the noncomparative schools ($p = 0.04$). Similar analysis of these data along with the 31 completed applications that were not ranked for the NRMP, was performed to determine whether the distribution among comparative and noncomparative schools of the scores of the applicants who were not ranked in the matching program were distributed similarly to those of the applicants who were ranked. The means of the scores awarded by the residency selection committee for all applicants from each school using both ranked and unranked applicants were divided into the following five strata: 100 to 149, 150 to 199, 200 to 249, 250 to 299, and 300 and over. The chi-square was 8.85 ($p = 0.06$) in testing for the statistical signifi-

TABLE 4

Means of Scores Awarded by Duke University Medical Center Selection Committee to Applicants to Pediatric Residency Program from 27 Medical Schools Classified as Providing 'Comparative' Information and 29 Schools Providing 'Noncomparative' Information, 1984–85*

Mean Scores of Applicants†	No. of Schools	
	Comparative	Noncomparative
100 to 149	9	1
150 to 199	7	12
200 to 249	8	10
250 and over	3	6
Total	27	29

* Chi-square (with three degrees of freedom) = 8.88, ($p = 0.03$); chi-square for trend (with one degree of freedom) = 4.38 ($p = 0.04$).

† Scores assigned by committee to applicants ranged from 100 (highest) to 500 (unacceptable).

cance of the differences between the comparative and noncomparative schools. Students from comparative schools received the higher scores.

The scores did not appear to be distributed normally, and so a nonparametric test, the Mann-Whitney U test, was performed. A U value of 287.5 ($p = 0.09$) was obtained for the ranking differences of applicants from comparative and noncomparative schools. Taken together, the two tests of significance indicate a statistically significant difference between the two groups of schools at a p level of about 0.05. This indicated that students whose applications contained comparative information concerning their relative class standing had been ranked for the residency significantly more favorably than were applicants from whom comparative class standing was not available.

Differences in the academic strengths of comparative and noncomparative medical schools were demonstrated by an analysis of the mean rankings of the schools from the Gourman report (2). According to that report, the mean ranking was 48.5 (stronger) for the noncomparative schools and 62.3 (weaker) for comparative schools. By a Mann-Whitney U test, the noncomparative schools had higher ranking than did comparative schools ($p = 0.09$).

Discussion

The formats by which medical schools present the accomplishments of their graduating students are highly variable. All the medical schools in the study described here provided descriptive dean's letters. The letters of recommendation were difficult to evaluate and were almost all very laudatory. The interviews were felt by the authors to be important in confirming that the student's record was an accurate representation of the student's strengths. However, many of the considerations which led to the ranking score by the residency selection committee were based upon the data in the transcript, the dean's letter with its summary statement, and any indications of class standing.

Several aspects of the study of the transcripts were thought to be particularly important. First, the variable grading systems used by the medical schools ranged from three passing grades to only one passing grade and included numerical systems. Not all schools defined the system which they used, and consequently there were instances of unclear, possibly misinterpreted, and inadequate information. Some schools provided accompanying information on the grading system other than by a key, such as in a paragraph in the dean's letter.

Second, the importance of information on the distribution of awarded grades was exemplified by a school in which a bar graph of the letter grades A through D were given for the required courses in years 1, 2, and 3. One junior-year clerkship awarded an A to 70 percent of the class, and another course awarded an A to only 18 percent, demonstrating the wide range of achievement which had been signified by an A. A grading system that provides three passing grades is often assumed to provide better information concerning the student's achievements than is a system of two passing grades. However, the authors of the present study found that students in some courses with three possible passing grades were awarded almost solely A's and B's; this led to grade distributions which were very similar to those of schools with only two passing grades. For all of these reasons, the student's achievements are most likely to be appropriately understood by residency selection committee members when they are accompanied by grade distribution information.

A bias in ranking which favored the students for whom comparative data had been provided and which was statistically significant appeared in the study. This occurred in spite of the observation that the noncomparative schools were significantly more "distinguished" than those in the comparative category. According to the ratings of the Gourman report, schools providing comparative information were less distinguished than those providing noncomparative information. The relative disadvantage for the students graduating from comparative schools provided a conservative bias, since the selection committee would have been expected to have favored students from the more distinguished, noncomparative schools. Instead, the students from the comparative schools were the more highly ranked, and this fact further strengthens the significance of the findings reported here.

Several prior studies have considered aspects of grading systems in relation to the residency selection process. In 1978 Moss and colleagues analyzed the performance of two cohorts of surgical residents, one from pass/fail and one from graded medical schools (3). The residents who had graduated from a school which used grades received significantly better performance ratings during their surgical rotations than the residents from the pass/fail schools. The authors of that study attributed this discrepancy in performance to the impetus to achieve due to the competition with which the students from graded schools were accustomed. It is also possible that their selection committee had been able to identify them as the superior students.

Other indications that grades may predict the excellence of postgraduate performance are found in a study of graduates of Jefferson Medical College (4). That study was based upon a questionnaire sent to the directors of residency training programs of 535 graduates between 1971 and 1975 and provided a comparison of postgraduate competence and medical school achievement. The strongest correlations were found between excellent performances as a resident and grades of 85 or above as a junior medical student and performance on the NBME Part II examination. Strong grades in the senior year also correlated with residency performance. Information on honors grades in clinical clerkships has been cited by program directors as being particularly important in the selection process (5).

In the present study, the authors describe the various methods chosen by U.S. schools of medicine to convey the academic accomplishments of their students. There was a wide range of methods by which the scholastic achievements of the students were described, in many instances leading to uncertainty among members of the selection committee about the meaning of the grades which had been awarded. Some schools provided sufficient information to enable the residency selection committee to know the relative position of the applicant within the class, and students from those schools were perceived by the committee to be the better candidates for the residency positions.

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